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The genus *Ditrichum* (Musci) in Maine

Bruce Allen[1]

Ditrichum is a genus of small, erect mosses nearly always found in small tufts or scattered on bare soil. They are primary colonizers occurring in open, disturbed and weedy places, roadbanks, and bare areas in the woods. Its species are difficult to recognize not so much because of interspecific character variation but because the characters themselves are nondescript (Anderson & Bryan 1958).

The genus is defined by sporophytic features: long setae, elongate capsules, differentiated opercula and haplolepideous peristome split into two linear segments. Gametophytically it is nearly impossible to distinguish *Ditrichum* from *Pleuridium*, *Dicranella*, *Bruchia*, and *Trematodon*. The later two genera belong in the Bruchiaceae, they have capsules with long, slender necks and subreniform spores often with distict proximal and distal surfaces; *Bruchia* also is cleistocarpous while *Trematodon* has entire peristome teeth. *Dicranella* belongs in the Dicranaceae, it has broader peristome teeth divided only in the upper half. *Pleuridium* and *Ditrichum* belong in the Ditrichaceae. *Pleuridium* has immersed, cleistocarpous capsules. Despite their sporophytic differences the two genera are phylogenetically close and can hybridize to form sterile sporophytes with intermediate character states (see Anderson and Snider 1982).

Anderson and Bryan (1958) provided a useful treatment of the autoicous species of *Ditrichum*. In the following key species not now known from Maine but expected to occur there are in brackets.

Ditrichum Hampe, Flora 50: 181. 1867. *nom. cons.*

Plants small, loosely erect, tufted or scattered plants, simple or forked. Leaves erect-spreading to spreading, curved, secund, or imbricate, lanceolate-subulate or ovate-lanceolate, gradually acuminate, subulate, acute to narrowly obtuse, concave; margins plane, erect, or narrowly recurved, entire to serrate near apex; cells smooth, thin- or thick-walled, elongate below, subquadrate to linear above; costa subpercurrent to excurrent. Setae elongate, straight or flexuose. Capsules cylindrical and erect to suberect or ovoid-cylindrical and inclined, smooth or

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weakly furrowed when dry; opercula obliquely and bluntly conic-rostrate; annulus of 2-3 rows of large cells, compound, deciduous or persistent; stomata present; peristome single, teeth 16, deeply cleft into 2 linear, papillose or spirally striate segments. Calyptrae cucullate. Spores spherical, smooth or papillose.

Key to the species of *Ditrichum* in or expected to be found in Maine

1. Plants over 1 cm high, usually densely tomentose; cells at shoulder of leaf base quadrate to rounded-rectangular . . . . [*D. flexicaule*]
1. Plants less than 1 cm high, not tomentose; cells at shoulder of leaf base elongate, rectangular, or oblong . . . . 2.

2. Plants autoicous . . . . 3.
2. Plants dioicous . . . . 4.

3. Setae orange-yellow or reddish; peristome more than 1 mm long; spores 11-13 µm nearly smooth . . . . [*D. rhynchostegium*]
3. Setae bright-yellow; peristome less than 1 mm long; spores 16-29 µm, papillose . . . . 2. *D. pallidum*

4. Plants usually with straight, terete innovations having short, blunt, appressed leaves; median leaf cells on non-innovation leaves linear, margins mostly plane; peristome teeth densely and evenly papillose . . . . 1. *D. lineare*
4. Plants not bearing differentiated innovations; median leaf cells subquadrate to short rectangular, margins narrowly recurved; peristome teeth spirally striae often with papillae . . . . 3. *D. pusillum*

1. ***Ditrichum lineare*** (Sw.) Lindb., Acta Soc. Sci. Fenn. 10: 108. 1871.
Trichostomum lineare (Sw.) Sull in Aust., Bull. Torrey Bot. Club 6: 74. 1876. *hom. illeg.*
Didymodon linearis Sw., Adnot. Bot. 100. 1829.

Plants small, dark green, caespitose, 4-15 mm high, nearly always with straight innovations having short, imbricate, blunt to cucullate leaves. Stem leaves 1-2

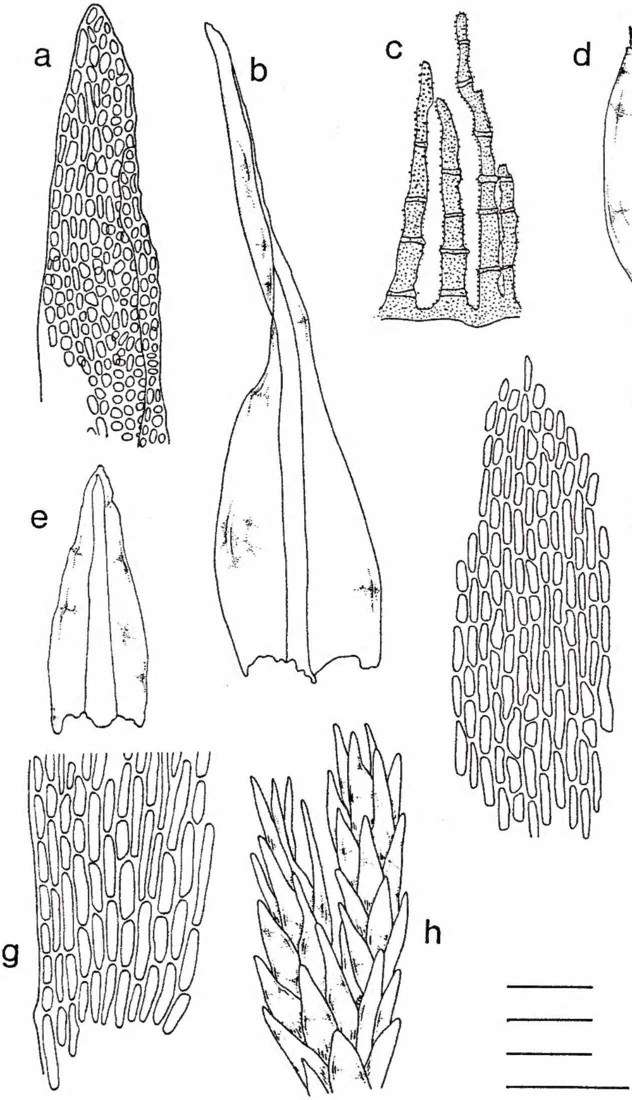

Figure 1. *Ditrichum lineare*. a. Leaf apex. b. Stem leaf c. Peristome teeth, dorsal (outer) surface. d. Capsule, peristome, and part of seta. e. Innovation leaf. f. Median leaf cells. g. Basal leaf cells and leaf margin. h. Habit, innovation branches. Scales in mm: top = 0.05 (a,c,f,g); subtop = 0.2 (b,e); subbottom = 0.5 (d); bottom = 1.0 (h).

mm long, appressed, lanceolate, bluntly acuminate, subentire at apex; margins plane or irregularly recurved, at times bistratose; percurrent; upper cells rectangular to linear, firm-walled, basal cells, oblong-linear. Dioicous. Setae 10-25 mm long, straight, yellow or brownish becoming reddish-brown. Capsules 1-2 mm long, cylindric, erect, suberect, or inclined, smooth or weakly furrowed when dry; opercula 0.3-0.7 mm long; peristome teeth, papillose, brown. Calyptrae 1.0-1.5 mm long. Spores 13-16 µm, finely papillose.

On bare soil or sandy gravel often in recently disturbed sites, in woods, along trails, the edges of pools, and on boulders near lakes. In Maine known from Androscoggin (*Allen 2426* MO), Cumberland (*Norton & Kendall* MAINE), Franklin (*Allen 10242* MO), Hancock (*Pedano 652* MO), Kennebec (*Allen 14785* MO), Lincoln (*Allen 14748* MO), Oxford (*Parlin 14163* MAINE), Piscataquis (*Merrill 140* MAINE), Washington (*Holmes 289* MO), and York (*Redfearn 37850* MO) counties.

Ditrichum lineare usually has numerous branches with short, blunt leaves that enable the species to be recognized. Collections that lack these branches are difficult to distinguish from *D. pusillum*. The stem leaves of both species are similar in shape, but the median cells in *D. pusillum* are subquadrate to short rectangular and the margins are narrowly recurved or thickened. When identifying *D. lineare* it is important to examine the stem and not the innovation leaves since the latter often have quadrate leaf cells and margins extensively recurved. The two species also have different types of peristome teeth ornamentation. In *D. pusillum* the teeth are horizontally to obliquely striate while those of *D. lineare* are densely and evenly papillose. Perichaetial leaf shape has also been used to separate the two species (Ireland 1982). In *D. lineare* the perichaetial leaves are abruptly narrowed and the apex is shorter than the sheathing base, while in *D. pusillum* the narrowed apex is equal to or longer than the sheathing base. However, perichaetial leaf shape is not a stable feature and sometimes both types can be found in collections of *D. lineare*.

Although most collections of *D. lineare* can be named with confidence, the presence of *pusillum*-type features in the innovation leaves of *D. lineare* are bound to cause difficulties. Even more problematical are collections such as Grout's North American Musci Perfecti *357* (MO) and *Allen 10280* (MO) which have typical *D. pusillum* leaves but lack striate peristome teeth. Until these intermediate collections can be further study I have placed them in *D. pusillum*.

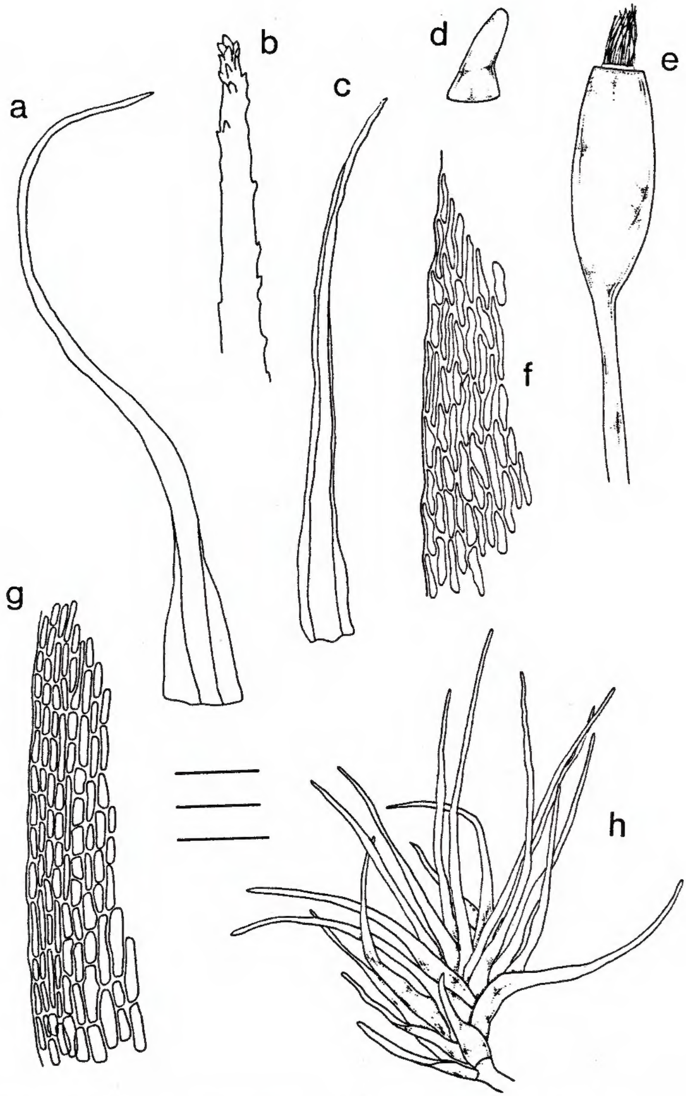

Figure 2. *Ditrichum pallidum*. a. Stem leaf. b. Leaf apex. c. Branch leaf. d. Operculum. e. Capsule, peristome and part of seta. f. Median leaf cells and leaf margin. g. Basal leaf cells and leaf margin. h. Habit. Scales in mm: top = 0.05 (b,f,g); middle = 0.5 (a,c,d,e); bottom = 1.0 (h).

2. **Ditrichum pallidum** (Hedw.) Hampe, Flora 50: 182. 1867.
Didymodon pallidus (Hedw.) P. Beauv., Prodr. 56. 1805.
Trichostomum pallidum Hedw., Sp. Musc. Frond. 108. 1801.

Plants small, silky, in green or yellow tufts, to 5 mm high. Leaves 3-5 mm long, erect-spreading to subsecund, flexuous or contorted when dry, ovate-linear to ovate-lanceolate, long- subulate, serrulate at apex; upper cells rectangular to linear, cells at shoulders oblong or oblong-linear, basal cells, oblong-hexagonal to rectangular; costa broad at base, filling most of the subula. Autoicous, perigonia axillary. Setae 12-40 mm long, bright yellow, flexuous when dry. Capsules 1.5-2 mm long, subcylindrical, suberect to inclined, smooth, becoming furrowed when dry; opercula 0.3-0.8 mm long; peristome teeth, spiculose, reddish-brown. Spores 16-29 µm, papillose.

On bare soil. In Maine known from Cumberland (*Lowe* MAINE), Kennebec (*Merrill 27* MO), Lincoln (*Allen 261* MO), Oxford (*Parlin* MAINE), Penobscot (*Sturgis 13229* MAINE), Somerset (*Allen 9419* MO), and York (*Lowe* MAINE) counties. Reported by not verified from Hancock (Greenwood 1927, Patterson 1930) county.

Ditrichum pallidum is often weedy on bare soil, but it is also found on soil at the base of trees. The plants have a soft, silky look and can be mistaken for a *Dicranella*. Indeed the two genera are gametophytically inseparable; *Dicranella* differs in having broader peristome teeth that are divided only in the upper half. Sporophytes are common in this species because of its autoicous condition. This enables it to be recognized in the field by its long, bright yellow setae, inclined, subcylindrical capsules and deeply divided, linear peristome teeth.

3. **Ditrichum pusillum** (Hedw.) Hampe, Flora 50: 182. 1867.
Trichostomum pusillum (Hedw.) Sm., Fl. Brit. 3: 1237. 1804.
Didymodon pusillus Hedw., Sp. Musc. Frond. 104. 1801.

Plants small, yellow-green, caespitose, 4-6(-11) mm high. Leaves erect-patent, 1.5-2.5 mm long, lanceolate or linear-lanceolate, gradually acuminate, more or less serrulate at apex; margins irregularly thickened and recurved in upper 1/2; upper cells subquadrate to short rectangular, firm-walled, basal cells, elongate; costa percurrent. Dioicous. Setae 6-12 mm long, straight reddish-brown. Capsules

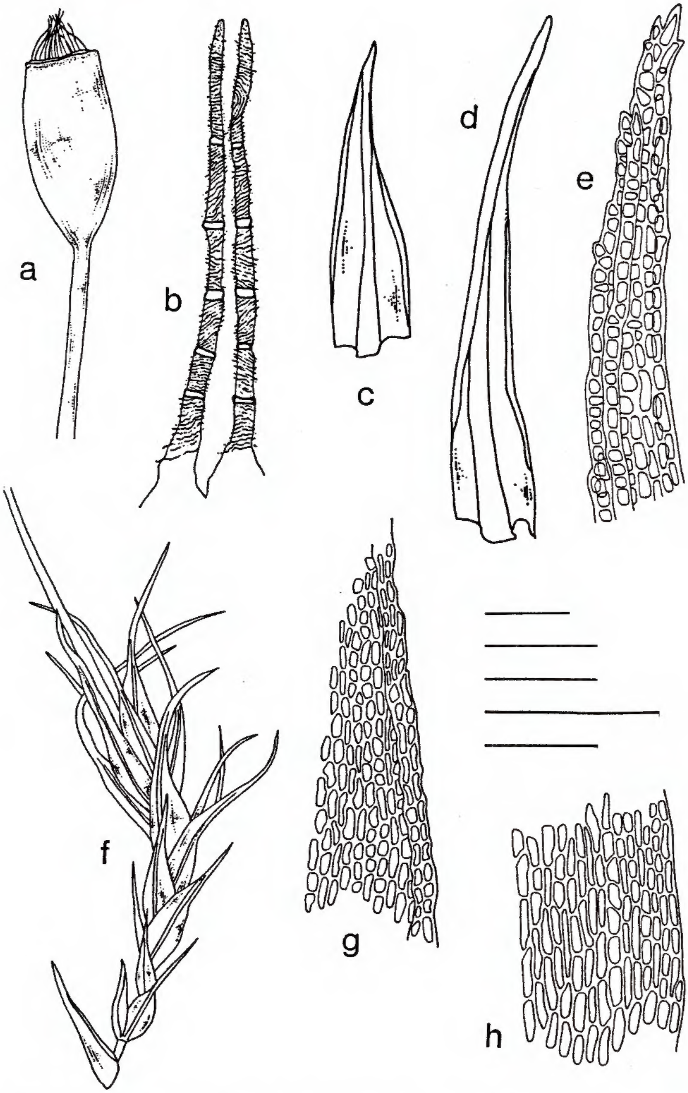

Figure 3. *Ditrichum pusillum*. a. Capsule, peristome, and part of seta. b. Peristome teeth, dorsal (outer) surface. c. Branch leaf. d. Stem leaf. e. Leaf apex. f. Habit. g. Median leaf cells and leaf margin. h. Basal leaf cells and leaf margin. Scales in mm: top = 0.05 (e,g,h); subtop = 0.05 (b); middle = 0.5 (a); subbottom = 0.5 (c,d.) bottom = 1.0 (f).

1-1.5 mm long, erect, cylindric, symmetric, smooth or weakly furrowed when dry; opercula 0.5 mm long; peristome teeth, papillose, with fine, oblique-ridges. Calyptrae 1.0-2.5 mm long. Spores 11-16 µm, smooth.

On bare soil. In Maine known from Androscoggin (*Allen 14686* MO), Aroostook (*Blake* MAINE), Cumberland (*Niles* MAINE), Franklin (*Allen 10280* MO), Hancock (*Pedano 579* MO), Lincoln (*Allen 1255* MO), Oxford (*Poole 13234* MAINE), and Penobscot (*Merrill 128* MO) counties. Reported by not verified from Kennebec (Pittman 1928, 1929), Piscataquis (Hermann 1964), Waldo (Parlin 1939), and Washington (Spencer 1993) counties.

Ditrichum pusillum is a slender plant with erect-patent leaves. It is often confused with *D. lineare*. It differs from that species in having shorter median leaf cells, narrowly recurved leaf margins and obliquely striate peristome teeth. Unfortunately, the peristome teeth in this species are not always striate, as can be seen in an odd collection from Franklin county (*Allen 10280*) which has typical *D. pusillum* leaves, but evenly papillose peristome teeth.

Acknowledgments. I thank the curators of MAINE for the loan of specimens.

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El Orden Funariales en el Valle de México, México

Angeles Cárdenas S.[1]

El Valle de México es una cuenca endorreica localizada en la parte central de la República Mexicana. Sus dimensiones, características e importancia biológica han sido descritas por Rzedowski y Rzedowski (1979); Cárdenas (1988) hizo referencia a los variados microhábitats que ocupan los musgos en esa área. En la presente contribución se enlistan los representantes del Orden Funariales que en esta zona se caracterizan por crecer sobre el suelo, en lugares perturbados que han sido sometidos a la tala inmoderada o al fuego. Tales actividades se realizan en el Valle de México desde hace más de 400 años, pero es probable que hayan sido practicadas desde épocas prehispánicas.

En México, el orden Funariales comprende 4 familias, 8 géneros y 22 especies y variedades (Sharp, 1994). La identificación de los ejemplares recolectados en años previos y los datos de la bibliografía y de herbario indican que el orden Funariales en el Valle de México incluye 3 familias, 7 géneros y 12 especies y variedades, es decir, el 54% de los taxa infragenéricos registrados para todo el país. Aun cuando todos los ejemplares recolectados a la fecha han sido identificados, es evidente que los datos de ditribución todavía son deficientes. En casos como los de *Entosthodon lindigii*, *Gigaspermum repens*, *Lorentziella imbricata* y *Micromitrium austinii* que se conocen de una sola localidad en el Valle de México, la ausencia de otros registros puede deberse en parte a la dificultad para reconocer muestras estériles.

A continuación se enlistan las 12 especies y variedades de Funariales conocidas del Valle de México; los epítetos específicos van seguidos del nombre del colector y número de colecta; los ejemplares del autor sólo se citan por número de colecta. Además, se proporcionan datos sobre vegetación, altitud y distribución en el área de estudio y en el mundo.

Entosthodon lindigii (Hampe) Mitt. 4531. Bosque de *Pinus* abierto. 3370 m. Estado de México (Isidro Fabela). En México sólo se conoce de esta localidad. México; Colombia; Bolivia.

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E. longicollis Mitt. (= *E. obtusifolius* Hook. Fife, 1987). 3188a. Bosque de *Quercus*. 2600 m. Estado de México (Villa Nicolás Romero). México; Guatemala y Costa Rica; Ecuador.

Funaria apiculatopilosa Card. 4700. Bosque de *Quercus* perturbado; matorral de *Quercus* achaparrado; matorral xerófilo. 2520 m. Estado de México (Tepotzotlán, Texcoco); Hidalgo (Pachuca). México; Texas.

F. hygrometrica Hedw. var. *calvescens* (Schwaegr.) Mont. 1938, 5177a. Bosque de *Pinus*; *Quercus*; matorral. 2740-2830 m. Estado de México (Texcoco, Naucalpan, Tepotzotlán, Tlalmanalco). Areas tropicales y subtropicales del mundo.

F. hygrometrica Hedw. var. *hygrometrica*. Delgadillo 5626. Jardín doméstico. 2240 m. Distrito Federal (Iztapalapa). Cosmopolita.

F. muhlenbergii Turn. 4710, 5194. Bosque de *Juniperus*; matorral. 2335-2750 m. Estado de México (Huehuetoca, San Juan Teotihuacán); Hidalgo (Epazoyucan); Tlaxcala (Calpulalpan). México; Oeste de Norteámerica; Europa.

F. sartorii C. Müll. 1932; Amable 1206. Bosque de *Quercus*. Estado de México (Texcoco); Distrito Federal (Desierto de los Leones). Endémica a México.

Gigaspermum repens (Hook.) Lindb. M. Castilla 2699. Pastizal inducido. 2700 m. Estado de México (Tlalmanalco). En México únicamente se conoce de esta localidad. México; Australia y Nueva Zelanda; Africa del Sur.

Lorentziella imbricata (Mitt.) Broth. 4691a. Matorral perturbado. Estado de México (Carretera Texcoco-Apizaco). En México sólo se conoce de esta localidad. México; Texas; Argentina; Paraguay y Uruguay.

Micromitrium austinii Aust. 3886a. Bosque de *Quercus*. Estado de México (Tepotzotlán). En México sólo se conoce de esta localidad. México; Panamá; Brasil; Puerto Rico y se distribuye ampliamente en el Este de los Estados Unidos de América.

Neosharpiella aztecorum Robins & Delg. 4532. Delgadillo 1322. Bosque de *Pinus* abierto; zacatonal alpino. Estado de México (Popocatépetl, Iztaccíhuatl, Isidro Fabela). Endémica a México.

Physcomitrium subsphaericum Schimp. 4526. Lecho de arroyo. 2300 m. Estado de México (Tepotzotlán). México; Guatemala.

CLAVE PARA LAS FUNARIALES DEL VALLE DE MEXICO

1.- Plantas efímeras, diminutas, menos de 1 mm de alto; cápsula inmersa 2

2.- Plantas verdes, brillantes; cápsula dehiscente por una línea en la mitad de la urna; esporas pequeñas, 27-32 µm de diámetro .... *Micromitrium austinii*

2.- Plantas pálidas, blanquecinas; cápsula indehiscente o dehiscente apicalmente; esporas grandes más de 100 µm de diámetro ....

3.- Hojas superiores ovado-lanceoladas, ápice subulado, ecostadas; cápsula dehiscente apicalmente .... *Gigaspermum repens*

3.- Hojas superiores ampliamente ovadas, ápice acuminado, costa excurrente como un pelo; cápsula indehiscente .... *Lorentziella imbricata*

1.- Plantas perennes, más de 1mm de alto; cápsula exserta 4

4.- Cápsula inclinada y asimétrica 5

5.- Cápsula fuertemente sulcada cuando seca, annulus presente y revoluble 6

6.- Cápsula erecta a ligeramente inclinada, urna claramente adelgazándose en el cuello .... *Funaria hygrometrica* var. *calvescens*

6.- Cápsula horizontal a erecta, urna corta, no adelgazándose en el cuello .... *Funaria hygrometrica* var. *hygrometrica*

5.- Cápsula lisa cuando seca, annulus ausente 7

7.- Hojas oblongas, con el borde serrulado en el ápice, costa excurrente en un pelo; cápsula erecta, segmentos del endostoma la 1/2 de la longitud del exostoma .... *Funaria apiculatopilosa*

7.- Hojas ovadas-obovadas, con el borde crenado-serrulado, costa subpercurrente; cápsula curvada, segmentos del endostoma 2/3 de la longitud del exostoma 8

8.- Apice de la hoja agudo prolongándose en un pelo, borde crenulado .... *Funaria muhlenbergii*

8.- Apice de la hoja redondeado, prolongándose en un pequeño apículo, borde serrulado .... *Funaria sartorii*

4.- Cápsula erecta y simétrica 9
  9.- Cápsula subesférica; hojas con costa fuerte, débil o ausente 10
    10.- Plantas 1-2 mm de alto; hojas oblongas, con ápice agudo, costa fuerte, percurrente; cápsula subesférica, lisa; células exoteciales de paredes gruesas a colenquimatosas .... *Physcomitrium subsphaericum*
    10.- Plantas hasta 1 cm de alto; hojas ovadas, cóncavas, obtusas y con un pequeño apículo; costa débil menos de la mitad de la longitud de la hoja o ausente; cápsula globosa, arrugada cuando secas y vacía; células exoteciales de paredes delgadas-firmes .... *Neosharpiella aztecorum*
  9.- Cápsula piriforme; hojas con la costa fuerte subpercurrente a excurrente 11
    11.- Hojas oblongas, agudas; costa excurrente en un pelo amarillo; seta corta, 3 mm de alto, gruesa y papilosa en los 2/3 superiores .... *Entosthodon lindigii*
    11.- Hojas obovadas, obtusas; costa subpercurrente; seta larga, 11 mm de alto, delgadas y lisas .... *Entosthodon longicollis*

Agradecimientos. Al Dr. Claudio Delgadillo por la revisión crítica del manuscrito y su apoyo en los trabajos de campo.

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Moss Records for Northcentral Mississippi - 1

Cynthia M. Galloway[1] and Charles L. Burandt[2]

As is true for many places in the United States, the moss flora of Mississippi has been studied little. Most records are from the southern half of the state (Reese & Lemmon, 1970; Reese & Pursell, 1963). Limited moss records have been reported from northern counties; Tishomingo (Buck, 1993; Wilkes, 1965), Grenada (Reese, 1987) and Itawamba (Buck, 1993). A few mosses have been reported from the central part of the state (Buck & Anderson, 1993).

The 196 collections reported here are from 14 counties of poorly inventoried northern Mississippi and one county in central Mississippi (Fig. 1). They represent 53 species and include 140 county records. Eight of the species have previously been recorded only once for the state and two species, *Desmatodon porteri* and *Thelia lescurii* are new for the state. *Desmatodon porteri* has previously been reported as far south as Tennessee (Crum & Anderson, 1981) and this collection represents a southward extension of the range.

Specimens numbered 1 through 2502 were collected by Charles L. Burandt and those numbered 2503 through 2610 collected by Charles and Sonya Burandt. All specimens are in the private collection of the senior author. Nomenclature is according to Anderson *et al.* (1990).

Collection Sites

Counties in which collections were taken are represented below by a three letter abbreviation. In the cases of multiple collecting sites within a county, each site is identified further by the assignment of a collection site number.

ALC, Alcorn Co.: Hwy. 72, on dirt road 5.6 mi. E of Tippah Co. line. 8 March 1994. **BEN**, Benton Co.: Hwy. 4, 2.5 mi W of Hwy. 5 intersection. 12 May 1993. **CHI**, Chickasaw Co.: 2 mi. S of Houlka on Co. Rd. 14, *Quercus* woods.

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26 Apr. 1993. **LAF**, Lafayette Co.: **LAF-1**, Oxford. Christman Dr. 16 Jan. 1993; **LAF-2**, University of Mississippi Biology Field Station. 23 Jan. 1993; **LAF-3**, Oxford. Washington Ave. at Molly Barr Rd. Hardwood Forest. 14 Feb. 1993; **LAF-4**, Oxford. Coliseum Dr., 0.15 mi. S of Hwy. 6 underpass. Hardwood Forest. 26 Apr. 1993. **LEE**, Lee Co.: Tombigee National Forest, Natchez Trace Pkwy., mile marker 235, 4.5 mi. S of Hwy. 32 exit for Okolona. Mixed *Pinus*-hardwood forest. 12 Feb. 1993. **MAR**, Marshall Co.: **MAR-1**, Holly Springs. Between bricks of sidewalk on the town square. Van Dorn St. 12 May 1993; **MAR-2**, Holly Springs Cemetery. 15 Feb. 1994; **MAR-3**, Cornersville. Hwy 349. On side of bldg. on soil. 18 Feb. 1994. **MAR-4**, Along Hwy. 349, at junction with Cornersville Rd. **NES**, Neshoba Co.: Hwy. 30. 3 mi. N of Newton Co. line; **PAN**, Panola Co.: **PAN-1**, Hwy. 315. Park area, 0.5 mi. below Sardis Dam, John W. Kyles State Park. 6 Feb. 1994; **PAN-2**, Hwy. 315, 2 mi. E of Hwy. 55; wooded area. 6 Feb. 1994. **PON**, Pontotoc Co.: On brick wall. Elvis Presley's birthplace, Elvis Presley Dr., Tupelo. 12 Apr 1993. **PRE**, Prentiss Co.: Hwy. 30, 8.4 mi. E of junction with Hwy. 364 and CR3421. Up to 1 mi. from Hwy. along roadside. 4 Apr. 1994. **TAT**, Tate Co.: **TAT-1**, Senatobia Cemetary, 6 Feb. 1994; **TAT-2**, Hwy. 4, E of Senatobia, 6.5 mi. E of junction with Hwy. 51 then right on blacktop road 3.0 mi., 6 Feb. 1994. **TIP**, Tippah Co.: Hwy. 370, 2 mi. E of county line, 1.1 mi. S of Ripley-Saulsberry to private 50 acre lake. Deciduous forest. On rotting tree trunk. 12 May 1993. **TIS**, Tishomingo Co.: **TIS-1**, Tishomingo Co. Rd. 321 toward J.P. Coleman State Park, 0.7 mi. E from 321 intersection with Tishomingo Co. Rd. 989. 16 May 1993; **TIS-2**, Same location as above. 7 March 1994; **TIS-3**, Entrance to J.P. Coleman Park. 7 March 1994. **UNI**, Union Co.: Hwy. 30, 1.8 mi. W of junction with Hwy 349 (near Lafayette Co. line). **YAL**, Yalobusha Co.: **YAL-1**, N side of Marquette St. at Ponola. Hardwood forest. 12 Feb. 1993. **YAL-2**, In crevices of a retaining wall at 617 Main Street; **YAL-3**, 100 mtrs. E of Main St. on Blackmur Dr. On brick and soil at base of building.

Species collected

Amblystegium varium (Hedw.) Lindb. **TIP**, *2496b*.

Anomodon attenuatus (Hedw.) Hueb. **MAR-3**, *2537a*. **TIS-2**, *2573b*, *2569b*, *2577c*.

Anomodon minor (Hedw.) Fuernr. **TAT-2**, *2515a*.

Anomodon rostratus (Hedw.) Schimp. **MAR-4**, *2551b.*

Atrichum angustatum (Brid.) Bruch. & Schimp. *in* B.S.G. **ALC**, *2582.* **BEN**, *2492.* **LAF-1**, *3*; **LAF-3**, *2486a*, *2487b.* **MAR-4**, *2549*, *2557a.* **PAN-1**, *2527*; **PAN-2**, *2528*, *2531b.* **PRE**, *2598a*, *2600b.* **TAT-2**: *2513.* **TIS-2**, *2575.* **UNI**, *2564.* **YAL-1**, *2468.*

Aulacomnium heterostichum (Hedw.) Bruch. & Schimp. *in* B.S.G. **PRE**, *2596.* **TIS**, *2575.*

Aulacomnium palustre (Hedw.) Schwaegr. **MAR-3**, *2538.*

Brachythecium oxycladon (Brid.) Jaeg. **MAR-3**, *2542a.*

Bryoandersonia illecebra (Hedw.) Robins. **LAF-3**, *2478.* **PRE**, *2594*, *2595a.* **TIS-2**, *2566a*, *2577a.* **TIS-3**, *2579b.*

Bryohaplocladium microphyllum (Hedw.) Wat. & Iwats. **PAN-1**, *2519*, *2520b*, *2524.* **PON**, *2486b.* **TAT-1**, *2505b.* **TIS-3**, *2578a.*

Bryum argenteum Hedw. **MAR-3**, *2537a.* **PAN-1**, *2516b*, *2520a.*

Bryum dichotomum Hedw. **MAR-3**, *2540*, *2544.* **PAN-1**, *2518.* **YAL-3**, *2473.*

Campylium chrysophyllum (Brid.) J. Lange. **CHI**, *2489.* **MAR-4**, *2546b.* **PAN-2**, *2531a.* **PRE**, *2597.* **TAT-2**, *2509a*, *2512.* **TIS-2**, *2569a.*

Campylium hispidulum (Brid.) Mitt. **LAF-2**, *17.* **MAR-4**, *2555b.* **TAT-2**, *2509b.*

Clasmatodon parvulus (Hampe.) Hook. & Wils. *ex* Sull. *in* Gray. **LAF-1**, *4*; **LAF-3**, *2483.* **MAR-4**, *2555a.* **PAN-1**, *2526*; **PAN-2**, *2530.* **TAT-1**, *2507.* **TAT-2**, *2515b.* **UNI**, *2559c*, *2560a*, *2563*, *2565.*

Ctenidium molluscum (Hedw.) Mitt. **TIS-2**, *2568a.*

Desmatodon plinthobius Sull. & Lesq. in Sull. **MAR-2**, *2533*; **PAN-1**, *2516a.* **TAT-1**, *2504b*, *2508.* **YAL-2**, *2472.*

* *Desmatodon porteri* James *in* Aust. **TAT-1**, *2504c.*

Dicranella heteromalla (Hedw.) Schimp. **CHI**, *2490.*

Dicranum condensatum Hedw. **PRE**, *2605.*

Dicranum scoparium Hedw. **LAF-3**, *2485.* **PRE**, *2606.* **TAT**, *2497.* **TIS-3**, *2579a.*

Ditrichum pallidum (Hedw.) Hampe **LAF-1**, *7*, *10.* **PAN-1**, *2517.* **PRE** *2591*, *2608.*

Drummondia prorepens (Hedw.) Brid. **LAF-1**, *11.*

Entodon seductrix (Hedw.) C. Muell. **BEN**, *2493.* **LAF-1**, *6*, *14*; **LAF-2**, *27*; **LAF-3**, *2479.* **LEE**, *2475.* **MAR-4**, *2548*, *2553.* **PAN-1**, *2522.* **PRE**, *2598b.* **TAT-1**, *2505a*; **TAT-2**, *2510.* **TIP**, *2494c*, *2495.* **TIS-2**, *2572b*; **UNI**, *2559b.*

Eurhynchium hians (Hedw.) Sande Lac. **PRE**, *2598c.*

Eurhynchium pulchellum (Hedw.) Jenn. var. *pulchellum.* **PRE**, *2602.* **TIS-2**, *2571a.*

Fissidens bushii (Card. & Thr.) Card. & Thr. **PRE**, *2603b.*

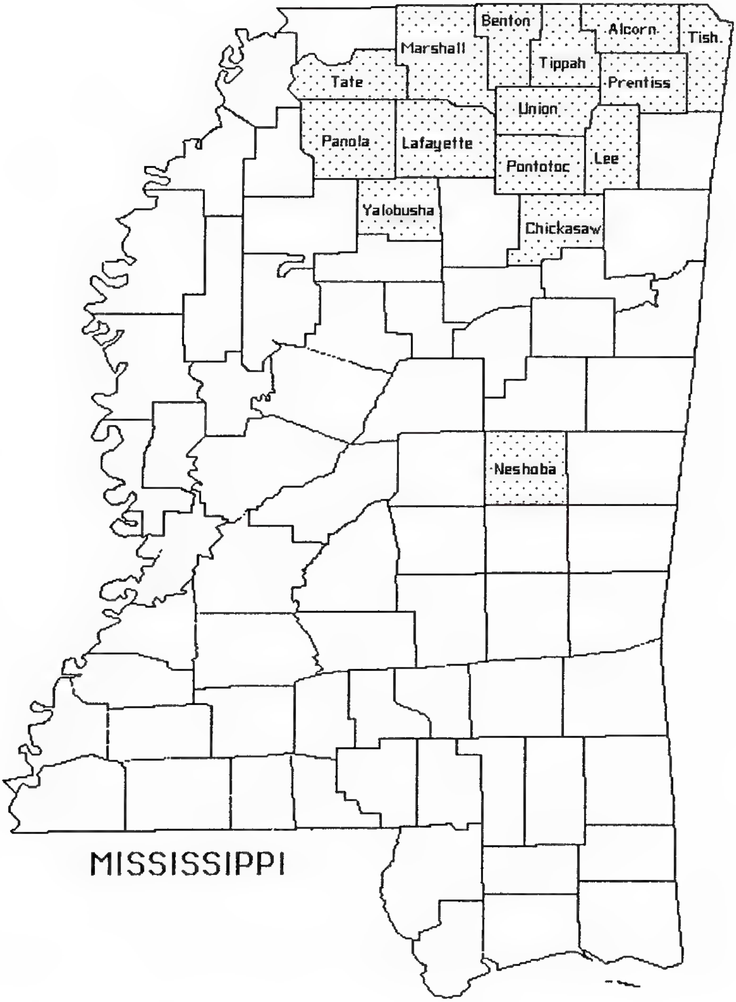

Figure 1. Map of Mississippi. Counties collected are shaded. (Tish. = Tishomingo)

Fissidens ravenelii Sull. **YAL-1**, *2469.*

Fissidens taxifolius Hedw. **LAF-3**, *2480, 2481.* **YAL-1**, *2471.*

Forsstroemia trichomitria (Hedw.) Lindb. **NES**, *2583.*

Funaria flavicans Michx. **MAR-1**, *2491.* **MAR-4**, *2556.*

Isopterygium tenerum (Sw.) Mitt. **LAF-1**, *5, 8.* **TIS-2**, *2574a.*

Leptodictyum riparium (Hedw.) Warnst. **MAR-3**, *2543.*

Leucobryum albidum (Brid. *ex* P. Beauv.) Lindb. **TIS-2**, *2574b.*

Leucodon julaceus (Hedw.) Sull. **LAF-1**, *1, 2*; **LAF-2**, *19.* **MAR-4**, *2552.* **PAN-1**, *2521.*

Physcomitrium pyriforme (Hedw.) Hampe. **UNI**, *2558b.*

Plagiomnium ciliare (C. Muell.) T. Kop. **LAF-3**, *2482.*

Plagiomnium cuspidatum (Hedw.) T. Kop. **LEE**, *2476.* **MAR-3**, *2542b.* **MAT-4**,*2557b.* **TIP**, *2494d.* **TIS-2**, *2569c.*

Platygyrium repens (Brid.) Schimp. in B.S.G. **LAF-3**, *2484.* **PAN-2**, *2529.* **YAL-1**, *2470*; **YAL-3**, *2474.*

Pogonatum brachyphyllum (Michx.) P. Beauv. **ALC**, *2581.* **LAF-1**, *12*; **TIS-3**, *2581.*

Pogonatum pensilvanicum (Hedw.) P. Beauv. **TIS-2**, *2567a.*

Polytrichum commune Hedw. var. *commune* **PRE**, *2592.* **TIS-2**, *2571b.*

Ptychomitrium drummondii (Wils.) Sull. **TAT-2**, *2511, 2514.* **TIS-1**, *2498.*

Schistidium apocarpum (Hedw.) Bruch & Schimp. *in* B.S.G. **PAN-1**, *2525.*

Sematophyllum adnatum (Michx.) Britt. **LAF-1**, *6*; **LAF-2**, *22*; **LAF-3**, *2479.* **MAR-4**, *2554.* **PRE**, *2607, 2609a.* **TIS-2**, *2572a, 2574c.* **UNI**, *2559a, 2560b, 2562.*

Steerecleus serrulatus (Hedw.) Robins. **LAF-1**, *9*; **LAF-2**, *25*; **LAF-3**, *2478.* **MAR-4**, *2546a.* **PRE**, *2601.* **YAL-1**, *2467.*

Thelia asprella Sull. *in* Sull. & Lesq. **PRE**, *2600a.*

Thelia hirtella (Hedw.) Sull. *in* Sull. & Lesq. **LAF-2**, *16, 18, 20, 21, 24, 25.* **NES**, *2584.* **PRE**, *2609b, 2610.* **TIS-1**, *2499a.*

* *Thelia lescurii* Sull. *in* Sull. & Lesq. **PRE**, *2604.*

Thuidium delicatulum (Hedw.) Schimp. in B.S.G. **PRE**, *2593, 2595b.* **TIS-2**, *2566b, 2576b*; **TIS-3**, *2578b.*

Tortella humilis (Hedw.) Jenn. **ALC**, *2580.* **CHI**, *2488.* **MAR-4** *2550, 2551a.* **PRE**, *2599b.* **TIP**, *2494a, 2496.* **TIS-2**, *2573a, 2577b.* **UNI**, *2558a.*

Trematodon longicollis Michx. **LAF-2**, *15.*

Weissia controversa Hedw. **LAF-2**, *23*; **LAF-3**, *2487a.* **MAR-2**, *2532*; **MAR-3**, *2539*; **MAR-4**, *2545, 2547.* **PAN-1**, *2523.* **PRE**, *2599a, 2603a.* **TAT-1**, *2504a.*

Acknowledgment: The senior author wishes to thank Dr. William D. Reese for his confirmations, determinations and/or corrections of the specimens reported here.

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Arctoparmelia incurva new to Washington

Jim Riley[1]

The lichen *Arctoparmelia incurva* (Pers.) Hale was collected on the lower slopes of Mt. Adams in Washington on the terminus of the Muddy Fork Creek lava flow at Lava Spring. The lava flow extends from the north slope of Mt. Adams near Red Butte (a parasitic cinder cone) at 2194 m (7200′) and curves north and westward down to Lava Spring at 1400 m (4600′). The lichen was typically found near the top, on the south sides (and occasionally other aspects), of those infrequent blocks of lava that rise two or more meters above the average height of the surrounding rocks. It was also observed on rocks along the southern rim of the sides of the lava flow. (Probably those places that remain exposed above the average level of winter snowpack.) A one day survey for the lichen conducted in August of 1994 found the lichen as high as 1524 m (5000′) on the flow (as high as the search was made).

Muddy Fork Creek and two other lava flows, Aiken and Mutton Creek, were formed from the latest volcanic activity on Mt. Adams. The Aiken flow extends south from the mountain at 2012 m (6600′) down to 1158 m (3800′). The Mutton Creek lava flow extends west from Mt. Adams from about 1890 m (6200′) to an irregular terminus of roughly 1585 m (5200′). During August of 1994, short surveys of the upper slopes of the Mutton Creek and Aiken lava flows were conducted without locating any of the lichen. While all three flows occurred at about the same time (1000 to 6000 years ago; Harris 1976) the Muddy Fork Creek flow has the appearance of being older than the other two, the rocks being a little lighter in color and slightly smoother in texture. Also, the Aiken lava is composed of smaller blocks of rock with little occasion for any to rise far above the average level.

Previously *A. incurva* had been reported from Alaska and the Yukon but no further south in western North America than British Columbia (Thomson 1984, Goward et al. 1994).

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Associated vascular species: *Abies lasiocarpa, Pinus albicaulis, Juniperus communis, Sambucus racemosa* var. *melanocarpa, Vaccinium membranaceum.*

Associated lichens: *Allantoparmelia alpicola, Cetraria hepatizon, Cladina mitis, Parmelia saxatilis, Pseudephebe pubescens, Sphaerophorus globosus, Thamnolia vermicularis, Umbilicaria kraschenninikovii,* and *U. vellea.*

Vouchers: U.S.A.: Washington: Yakima County, Gifford Pinchot National Forest, Mt. Adams Wilderness, Lava Spring, 46°18'N 121°30'W, 23 November 1993, *Riley 0184* (herb. Randle Ranger District, herb. Siuslaw National Forest, OSC).

Acknowledgements: I wish to thank Bruce McCune for his help in confirming the identification. I also wish to thank Linda Geiser for her help in preparing and reviewing this account and Katherine Glew for sample articles.

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Additions to the lichens of Thunder Bay District, Ontario

Teuvo Ahti[1] & Joan Crowe[2]

Abstract. *15 taxa are added to the list of lichens of the Thunder Bay District, and some supplementary comments on the list are made.*

The list of lichens of Thunder Bay District, Ontario, Canada, published by Crowe (1994) was based on specimens in North American herbaria. However, the first set of specimens collected by T. Ahti in 1958 in connection with his caribou range survey of northern Ontario, which formed the basis of the papers by Ahti (1964) and Ahti & Hepburn (1967), is deposited in Helsinki (H), Finland, and the second set at the Southern Research Station, Ministry of Natural Resources, Maple, Ontario, and these collections were not examined; some duplicates of these were found in Ottawa (CANL) and Thunder Bay (LKHD).

Below is a supplementary list of species reported by Ahti in his publications; the voucher specimens have also been rechecked by him. In addition, some crustose species not reported in the cited papers are added to the list, though many of the crustose specimens still remain unidentified. Ahti & Hepburn (1967) also published keys to the common macrolichens of northern Ontario.

In Helsinki (H) there are also about 350 specimens (mostly Cladoniaceae, not all duplicates) collected by P. Barclay-Estrup in Thunder Bay District, as well as duplicates (from TRTC, LKHD, and MSC) from that region collected by R. F. Cain, C. E. Garton, H. A. Imshaug, C. M. Wetmore and F. Erbisch. Mason E. Hale (material in US) likewise collected in the area.

The symbols and the abbreviations for collectors and locations are the same as those in Crowe (1994). *Parmelia fraudans* is cited because the earlier report was based on a single, unlocalized Macoun specimen. *Cetraria nivalis* and *Cladonia macrophylla* are repeated because in the earlier list the collection number was omitted or erroneous.

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It should also be noted that the specimen cited under *Cetraria islandica* by Crowe represents its subsp. *crispiformis* Räsänen (like all the Thunder Bay records of '*C.* cf.*islandica*' and '*C. ericetorum* var. unnamed II' in Ahti, 1964). However, Kärnefelt (1979) reported a single collection (MICH) of subsp. *islandica* in Thunder Bay District, too. All the material of *C. ericetorum* should belong to subsp. *reticulata* (Räsänen) Kärnef. Certain groups in Ahti (1964) and Crowe (1994), especially *Lepraria* and *Usnea*, have been listed according to outdated identifications, but because the material has not been revised according to recent (in part undergoing) taxonomic treatments, they are not commented upon here further.

Cetraria nivalis (L.) Ach. - Ahti 4427 Paradise I. (H, L)
**Cladonia bacilliformis* (Nyl.) Glück - Ahti 4029 Nip (H)
Cladonia borealis S.Stenroos - PB 1924 Shuniah St. (H). Most, if not all, of the earlier records of *C. coccifera* may belong to this species, following the revision by Stenroos (1989).
**Cladonia cryptochlorophaea* Asah.- Barclay et al.3047 Nolalu (H)
**Cladonia macilenta* Hoffm., s. str. - Ahti 4109 St. Ignace (H)
Cladonia macrophylla (Schaerer) Stenh. - Ahti 4054 Croll Twp. (H, L)
Cladonia pocillum (Ach.) Grognot - Ahti 4135 Nip (H)
**Cladonia wainioi* Sav. (*C. "wainii"*; syn. *C. pseudorangiformis* Asah.) Ahti 4367 Nip (H)
Heterodermia galactophylla (Tuck.) Culb. - Ahti 3747a Macdiarmid (H)
**Japewia tornoënsis* (Nyl.) Tönsb. (syn. *Lecidea tornoënsis* Nyl.) - Ahti 4898 Kenogamisis L. (H)
**Massalongia carnosa* (Dickson) Körber - Ahti 4825 SI (H)
Melanelia trabeculata (Ahti) Essl. - Ahti 4672 SI (H)
Parmelia fraudans (Nyl.) Nyl. - Ahti 4273 SI (H)
**Physcia tenella* (Scop.) DC. - Ahti 3962 Nip (H)
**Placynthiella icmalea* (Ach.) Coppins & P.James - CG 15399 p.p. (among *Trapeliopsis granulosa*) N. Fowl L. (H). This is probably a very common, overlooked species.
**Placynthiella oligotropha* (Laundon) Coppins & P.James - Ahti 4895 Kenogamisis L. (H)
**Toninia cumulata* (Sommerf.) Th.Fr. Ahti 4906 Paradise I. (H) In addition, some species reported as single collections by Crowe (1994) were found in other locations. Specimens are in Helsinki (H) most having been published in Ahti (1964), too, viz. *Baeomyces carneus*, *Caloplaca discolor*, *Cladonia*

grayi, *C. macrophylla*, *Collema furfuraceum*, *C. pulcellum*, *Parmelia fraudans*, and *Spilonema revertens*.

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Stenroos, S. 1989. Taxonomy of the *Cladonia coccifera* group. 1. *Ann. Bot. Fenn.* 26: 157-168.

David Wagner writes [2 November 1994] that he is ready to publish two documents on Pacific Northwest Liverworts. The *Icones Hepaticarum Oregonensis* will be photocopies on archival quality paper of illustrations prepared over the past fifteen years. The *Icones* will be either bound or unbound and the author considers them "public domain except for profit enterprises."

The second is his working manuscript for a hepatic flora of the Pacific Northwest, consisting mainly of current keys and a checklist with extended annotations. The documents will be published by the Northwest Botanical Institute and prices will be in the $20-$40 range.

For more information contact Dr. David H. Wagner, Northwest Botanical Institute, P.O. Box 30064, Eugene, Oregon 97403

Range extensions of *Usnea sphacelata* in Oregon and Washington

Jim Riley[1], Bruce McCune[2], and Peter Neitlich[2]

Abstract. *Usnea sphacelata* is reported new to Oregon. Additional sites for this rare lichen are given for Washington. The number of known locations in the U. S. A. is increased from two to seven.

Usnea sphacelata R. Br. is a rock-dwelling species in the subgenus *Neuropogon*. It is known from both poles, as well as a number of high mountain areas in Central and South America (Walker 1985). Its distribution in North American is anomalous in that it occurs in the Arctic archipelago (see map in Thomson 1984 as *Neuropogon sulphureus* (Th. Fr.) Hellbom), but is unknown from the vast region between the high Arctic and the Washington Cascades.

Usnea sphacelata was first reported from the Pacific Northwest by Imshaug (1954) who described it as *Neuropogon lambii* Imsh. The Arctic specimens were at that time considered *N. sulphureus*. Imshaug differentiated his new species from *N. sulphureus* by the "scabrid-verruculose" branches of that species. Walker (1985), however, in synonymizing *N. sulphureus* and *N. lambii* under *Usnea sphacelata*, considered the type of *N. lambii* to represent the smooth, epapillate extreme of a continuous range of variation. The specimens reported here are also largely epapillate. *Neuropogon* has most often been distinguished from *Usnea* by the black and epruinose apothecial disks in *Neuropogon*, a saxicolous habit, and a primarily southern hemispheric distribution. Walker (1985) chose not to recognize *Neuropogon* at the genus level, finding numerous intermediates in those characters in the southern hemisphere, as well as an absence of differences in anatomical characters.

Previously *Usnea sphacelata* was found in the state of Washington at Yakima Park, Mt. Rainier (Imshaug 1954) and on Disappointment Peak, a minor crest of Glacier Peak in the Glacier Peak Wilderness Area (Weber 1973). The nearest known locations north and south of these sites were in Mexico at 4000 m and in the Arctic archipelago (Walker 1985).

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The range in the continental United States was extended southward by Jim Riley who found the lichen on the slopes of Mt. Adams in 1992 (at Devil's Garden). Since then it has also been found at two other locations in the Mt. Adams Wilderness (Red Butte and head of the Lewis River). In 1994 it was found for the first time in Oregon by Bruce McCune on Mt. Hood and by Peter Neitlich and Warren Cohen on South Sister Mountain.

The collection of *Usnea sphacelata* on Mt. Adams was made in the Devil's Garden area on a large area of exposed rock on a broad ridge above the Highline Trail near the boundary of the Mt. Adams Wilderness and the Yakima Indian Reservation. It was also found on the summit of Red Butte (a parasitic cinder cone at 2400 m) and on rough exposed boulders near the head of Lewis River.

At the Devil's Garden *Usnea sphacelata* was associated with the vascular plants *Castilleja thompsonii, Lupinus lepidus* var. *lobbii, Oxyria digyna,* and *Phacelia sericea* and the lichens *Physcia dubia, Pseudephebe minuscula, Pseudephebe pubescens, Umbilicaria krascheninnikovii,* and *U. virginis.* At Lewis River it was associated with *Abies lasiocarpa, Pinus albicaulis, Juniperus communis, Penstemon davidsonii* and the lichens *Ahtiana sphaerosporella, Bryoria abbreviata, Cetraria canadensis, C. merrillii, Hypogymnia imshaugii, Lecanora pringlei, Letharia columbiana, Platismatia glauca, Pseudephebe pubescens, Rhizoplaca melanophthalma,* and *Umbilicaria krascheninnikovii.* At Red Butte associated species were *Lecanora pringlei, Pseudephebe pubescens, Rhizoplaca melanophthalma,* and *Umbilicaria krascheninnikovii.*

On Mount Hood, the population at Barrett Spur is fairly large, estimated at over 1000 individuals. There it occurs almost exclusively on the vertical faces of large boulders of volcanic rock. The population is at the upper edge of the krummholz of *Pinus albicaulis.* Clearly it is intolerant of the heavy snows of Mount Hood, being restricted to rock surfaces that do not accumulate much snow on the windswept, steeply sloping ridge. Associated species included *Adelolecia pilati, Lecanora intricata, Lecanora pringlei, Lecidea lactea, Melanelia stygia, Rhizocarpon copelandii, R. geographicum, Sporastatia testudinea, Tephromela armeniaca, Tremolecia atrata, Umbilicaria hyperborea, U. krascheninnikovii,* and *U. virginis.* Searches of a few similar areas on the north and west sides of Mount Hood failed to turn up any additional populations.

On South Sister Mountain *Usnea sphacelata* occurred on sheer steep buttresses of hard, dark, stable volcanic rock which rise several hundred meters out of a matrix of unconsolidated red volcanic ash and debris. The site of greatest abundance appeared to be at approximately 3000 m, ca. 250 m below the summit of the mountain. Other individuals were seen sporadically down to an elevation of ca. 2100 m on the northeast side of the mountain. Over 1000 individuals were estimated to be present. This species was found only on exposed slopes well above treeline. Associated species noted in this exposed site included *Melanelia stygia, Rhizocarpon geographicum, Rhizoplaca chrysoleuca,* and *Umbilicaria hyperborea.*

Localities: **USA: Oregon:** Deschutes County, Three Sisters Wilderness, just N of summit of South Sister, 44°06'N 121°46'W, 3000 m, *Neitlich 441* (OSC, herb. Neitlich); Hood River County, Barrett Spur on north side of Mount Hood, 45°24'N 121°42'W, 2075 m, *McCune 21656* (COLO, OSC, herb. McCune, herb. Rosentreter). **Washington:** Yakima County, Mt. Adams Wilderness, Devil's Garden, 46°14'N 121°28'W, 2377 m, *Riley 0087* (herb. Randle Ranger District, OSC); Red Butte, 46°15'N 121°27'W, 2195 m, *Riley* (not collected); Skamania County, near the head of Lewis River, 46°14'N 121°33'W, 1981 m, *Riley* (not collected).

Acknowledgments. We thank Linda Geiser and Katherine Glew for their assistance.

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Additions to the lichen flora of North America IV. *Scoliciosporum sarothamni*

Tor Tønsberg[1]

Abstract. Scoliciosporum sarothamni *is reported new to North America from Washington, USA, and British Columbia, Canada. The species is toxitolerant and is known only from urban and suburban sites.*

It is well-known that the lichen flora in towns usually differs markedly from that of areas with little or no air pollution. The literature dealing with air pollution and lichens is vast. Most papers focus on the scarcity of lichens in urban areas and the factors causing this poverty. However, some lichen species appear to have their main or only occurrences in polluted areas. The aim of the present note is to report a toxitolerant species, *Scoliciosporum sarothamni*, from the Pacific Northwest of North America. The species is believed to be new to North America as it is not listed by Egan (1987), in the recent changes to his checklist (Egan 1989, 1990, 1991) or as far as I know, in any other paper dealing with North American lichens. Unless otherwise stated, the nomenclature for lichens follows Egan (op. cit.).

Scoliciosporum sarothamni (Vain.) Vězda

Within the genus *Scoliciosporum*, this species is characterized by the punctiform, yellowish green soralia containing gyrophoric acid as the major substance. When fertile, it is further distinguished by the rather narrow (ca. 2 µm wide), S-shaped, up to 7-septate spores. The lichen may be mistaken for colonies of unlichenized green algae and it is thus easily overlooked. In fact, the species often occurs mixed in such algal colonies. On closer examination, the yellowish tinged soralia will be indicative for the presence of the lichen.

In 1994 I observed *Scoliciosporum sarothamni* in Seattle, Washington. The specimens were morphologically well in accordance with European material. Some immature apothecia associated with the soralia in some collections, seemed to belong to the lichen. The species was found to be common in every district of Seattle where it was searched for, viz. Ballard, Greenwood, Wallingford, University District, downtown, as well as in Edmonds just north of the city. The find of a specimen in Vancouver, British Columbia, after a short search for it, indicated that this lichen is common also there. In the Pacific Northwest, *Scoliciosporum sarothamni* has been found corticolous on trees in urban and suburban sites alongside more or less busy roads and once in a garden. The species occurred on smooth bark on trunks and/or on branches. The phorophytes were *Platanus* sp. (several collections), *Aesculus hippocastanum*, *Castanea sativa*, *Prunus* sp., *Sorbus* sp., and *Tilia* sp. On trunks of *Platanus* and *Aesculus* the lichen sometimes covered substantial areas. Associated lichens included, e.g., *Strangospora* sp. (in many collections), and *Lecanora conizaeoides*. The specimens were collected at altitudes up to 130 m.

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With the specimens cited below, *Scoliciosporum sarothamni* shows a Europe to western North America disjunct distribution.

Discussion

Among the corticolous lichen species, the following seem to have their only or main occurrences in sites with high levels of air pollution: *Lecanora conizaeoides* (see e.g. Laundon 1973, Hawksworth et al. 1973), in North America known from major cities on the east and west coasts (collected e.g. by the author in Seattle and Vancouver on the Pacific coast, and in Halifax, Nova Scotia, and St. Johns, Newfoundland, on the Atlantic coast), *Buellia pulverea* Coppins & P. James (Coppins & James 1978, Diederich 1989), not known from North America, and *Scoliciosporum chlorococcum* (Ahti & Vitikainen 1974). Ahti & Vitikainen characterized the latter species as the most toxitolerant lichen in the boreal zone. *Hypocenomyce scalaris* and *Lepraria rigidula* (B. de Lesd.) Tønsberg may be very abundant in urban and semiurban areas (Timdal 1984, Tønsberg 1992, 1993), but those species also occur in lichen rich localities with no evident sign of deterioration by air pollution. The occurrence of *Scoliciosporum sarothamni* in the Pacific Northwest agrees well with that in Norway where the species also has been found only in or just outside towns (Bergen, Kristiansand, and Oslo). Whether it is restricted to polluted sites throughout its range, is an open question as it is not a well-known species. Muhr (1989) and Wirth (1980), in treatments of the species for Sweden and parts of central Europe, respectively, did not mention specificially that the species is toxitolerant. However, they both stated that *S. sarothamni* prefers eutrophicated sites.

Johnson (1979) investigated the distribution of lichens on *Acer macrophyllum* along air pollution gradients in Seattle, Washington. On the basis of percent cover and frequency of occurrence, Johnson concluded that the most tolerant species were *Hypogymnia physodes*, *Parmelia sulcata*, *Physconia grisea*, *Hypocenomyce scalaris* (as *Lecidea scalaris*), and *Candelaria concolor*. Few crustose species were discussed in his study. Species such as *Lecanora conizaeoides* and *Scoliciosporum sarothamni*, today very abundant on a variety of phorophytes, might have been overlooked.

Specimens seen (deposited in BG if not otherwise stated): **CANADA. British Columbia**. Vancouver, 1994, *Tønsberg* 21346. **USA. Washington**. King County, Seattle: Downtown, 1994, *Tønsberg 21092*; Ballard, 1994, *Tønsberg 20135a* (BG, WTU), *20426a*, *20427a* (BG, DUKE, WTU); Greenwood, 1994, *Tønsberg 20425*, *21699*; University District, 1994, *Tønsberg 20428a* (BG, WTU); Wallingford, 1994, *Tønsberg 21700*. Snohomish County: Edmonds, 1994, *Tønsberg 20879*.

Acknowledgements. I thank Prof. Joe Ammirati, Seattle, for access to laboratory facilities at the Department of Botany, University of Washington, and Diane and Svein Aronsen, Seattle, for help in many ways during my stay in the Pacific Northwest in 1994.

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1995 ABLS MEETING

The 1995 meeting of the American Bryological and Lichenological Society will be held 29 July - 3 August at the Palisades Environmental Centre in Jasper National Park, Alberta, Canada. Field trips in the Rocky Mountains will visit alpine and subalpine areas, foothills montane zones, interior cedar temperate rain forests, and central ranges, with side trips to the Columbia Ice Field and Miette Hot Springs. Field trip leaders: Dale Vitt and René Belland (bryophytes); Bernard Goffinet and Trevor Goward (lichens). The meeting also includes papers, posters, photography workshops, and a symposium "The Application of Modern Molecular Tools to Classic Bryological and Lichenological Questions." Registration: US$50 ($35 students). Lodging: From US$52 (at the meeting site, food included) to US$80 in Jasper townsite (food not included). Transportation: Van from Edmonton to Jasper (about four hours). For information and registration form, contact Dale H. Vitt (Biological Sciences, CW 405 Bio. Sc. Bldg., University of Alberta, Edmonton, AB, Canada T6G 2E9; Tel 403-492-3380; FAX 403-492-1899) or Chicita F. Culberson (Botany, Duke University, Durham, NC 27708-0338, USA; FAX 919-684-5412; e-mail cculb@acpub.duke.edu). **Registration deadline is 1 May 1995**

The Bryophytes and Lichens of Rock Hill Preserve, Florida

Dana Griffin, III[1], Richard C. Harris[2] & William R. Buck[2]

Rock Hill, lying 4.5 miles southeast of Chipley in Washington County of the Florida Panhandle, has attracted the attention of botanists and geologists for much of this century. The vascular flora includes several listed or endangered taxa among which are *Bigelowia nuttallii, Asclepias viridula, Marshallia ramosa, Crotonopsis elliptica* and *Aster hemisphericus*. The geology of this locale is also noteworthy, representing the only exposed sandstone formation in Florida.

Harper (1911, 1914) laid claim to being the first botanist to visit Rock Hill and, undoubtedly, published the first record of a lichen (*Cladonia* sp.) from the site, but he misinterpreted the stratigraphy of the sandstone, asserting that it was an extension of the Altamaha Grit, a Miocene-age formation with outcroppings in Alabama and Georgia. The floras, particularly the cryptogamic, of Rock Hill and the Altamaha Grit do show considerable overlap (cf. Griffin, Snow & Buck 1994), but the Rock Hill sandstone lies to the south of the Altamaha Grit arc and is dated from the Middle Pliocene to the Pre-Nebraskan Pleistocene (Isphording and Lamb, 1970, 1971). It is classified as the Citronelle Formation and represents material washed down from the southern and southwestern flanks of the Appalachians. According to Dr. Walter Schmidt (per. comm.), Chief of the Florida Geological Survey, Citronelle materials surface in many localities in the Florida Panhandle, but only at Rock Hill are they cemented into a sandstone, a condition attributed to the relatively high level of iron oxides at this site.

Because sandstone is otherwise unknown at the surface in Florida, it is at the Rock Hill locality that certain lithophilous bryophytes and lichens have their only known Florida station. In this group are species such as *Grimmia laevigata, Hedwigia ciliata* and *Ptychomitrium incurvum*. Among the lichens the genera *Acarospora, Psorula, Pycnothelia* and *Xanthoparmelia* are known only from Rock Hill as well as a number of the species noted below. Another interesting phenomenon both here and at Broxton Rocks Preserve, Georgia (Altamaha Grit)

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is the large number of normally corticolous taxa which occur on the sandstone. As far as we know, Rock Hill and Broxton Rocks collections are the only records of *Pseudoparmelia sphaerospora* on rock. Although the list of lichens for Broxton Rocks is still in preparation, it is clear that the number of species at Rock Hill is considerably fewer though otherwise very similar. This could be due to a variety of factors; smaller site, drier site, historical factors and geographical position being the most obvious. The presence of *Toninia tristis* (Nebraska westward) and *Lecidella viridans* (Arizona and Texas) suggest a western element in the Rock Hill lichens.

Similarly, the bryophyte and lichen floras of the sandstone outcrops seem significantly different from those of granitic outcrops not far away geographically. At this stage this is just an impression and quantative studies are needed. However, it has recently been documented (Porembski *et al.* 1994) that granitic and sandstone outcrops in west tropical Africa have very different floras and that sandstone harbors a richer flora with more endemics.

In 1990 the Nature Conservancy acquired 373 acres of the Rock Hill habitat (now called Rock Hill Preserve) in a move to protect the unusual flora of the area. It is as a part of the on going inventory of the Rock Hill biota that the authors volunteered to conduct a survey of the bryophytes and lichens of the preserve. Insofar as we are aware, this is the first listing of these organisms from Florida's only sandstone formation.

The collections cited here are deposited at two herbaria, those of Harris (nos. 35574-35622) and Buck (nos. 27121-27186) at NY, those of Griffin (nos. 1792-1835, 2907-2974) at FLAS.

List of Species

MOSSES (D. Griffin and W. R. Buck)

CALYMPERACEAE
Syrrhopodon ligulatus Mont., 27183
DICRANACEAE
Campylopus carolinae Grout, 1808, 1830, 27138
Campylopus pilifer Brid., 1792
Campylopus tallulensis Sull. & Lesq. *in* Sull., 1793, 27150
Dicranella heteromalla (Hedw.) Schimp., 1794, 1813, 1828, 27160, 27166
Dicranum condensatum Hedw., 1797, 1825, 1833, 27131

DITRICHACEAE
Eccremidium floridanum Crum, 27169
FISSIDENTACEAE
Fissidens elegans Brid., 1802
FUNARIACEAE
Entosthodon drummondii Sull., 1801, 1824
GRIMMIACEAE
Grimmia laevigata (Brid.) Brid., 1819, 1832, 27180
HEDWIGIACEAE
Hedwigia ciliata (Hedw.) P. Beauv., 1798
HYPNACEAE
Isopterygium tenerum (Sw.) Mitt., 1795
LEUCOBRYACEAE
Leucobryum albidum (Brid.) Lindb., 1799, 1811, 1823, 1827, 27137
POLYTRICHACEAE
Atrichum angustatum (Brid.) B.S.G., 1800
Pogonatum brachyphyllum (Michx.) P. Beauv., 1818, 27173
PTYCHOMITRIACEAE
Ptychomitrium incurvum (Schwaegr.) Spr , 1810, 27171
SEMATOPHYLLACEAE
Sematophyllum adnatum (Michx.) E.G. Britt., 1805
SPHAGNACEAE
Sphagnum affine Ren. & Card., 1804, 1812, 1829, 1834, 27121
Sphagnum cyclophyllum Sull. & Lesq., 1809, 27161, 27168
Sphagnum lescurii Sull., 1820, 1821, 1835

HEPATICS (D. Griffin)

ADELANTHACEAE
Odontoschisma prostratum (Sw.) Trev., 1826, 1831
CEPHALOZIELLACEAE
Cephaloziella rubella (Nees) Warnst., 1814
DILAENACEAE
Pallavicinia lyellii (Hook.) S. F. Gray, 1796
JUBULACEAE
Frullania inflata Gott. *in* G., L. & N. var. *communis* Schust., 1806
Frullania kunzei (Lehm. & Lindenb.) Lehm. & Lindenb., 1807, 1816, 1817
LEJEUNEACEAE
Cololejeunea minutissima (Sm.) Schiffn. ssp. *minutissima*, 18O6a
Leucolejeunea unciloba (Lindenb.) Evans, 1815

LEPIDOZIACEAE

Kurzia sylvatica (Evans) Grolle, 1803

SCAPANIACEAE

Scapania nemorosa (L.) Dum., 1822

LICHENS (R. C. Harris)

The macrolichens of Florida are well known (Moore, 1968; Harris, 1990), but, although under intensive study, the microlichens are not. This will explain the tentative nature of many of the identifications below. Macrolichens previously not reported from Florida are referred to as "new". Macro- and microlichens which will probably prove unique to Rock Hill for the state are marked with an asterisk.

ACAROSPORACEAE

**Acarospora schleicheri* (Ach.) Massal. *s. lat.*, on rock, 2908, 35622

ARTHONIACEAE

Arthonia sp., on trunk of *Quercus geminata*, 2970 Ascomata irregular, thin, becoming quite broad, ocher, KOH+ green-blue; ascospores macrocephalic, 6-celled.

BACIDIACEAE

**Toninia tristis* (Th. Fr.) Th. Fr. *s. lat.*, on soil, 27123 This collection and others from Broxton Rocks are the only collections of *Toninia* in eastern North America south of the Arctic. They do not match any of the nine described subspecies.

CHRYSOTHRICACEAE

**Chrysothrix chlorina* (Ach.) Laundon, on rock, 35596

CLADONIACEAE

Cladina evansii (Abbayes) Hale & Culb., on soil, 2966, 35609

Cladina sandstedei (Abbayes) Ahti, on soil, 35618 This is the rarest of the Florida *Cladinae*. Its distribution is odd: western Panhandle and Dade and Monroe counties.

Cladina subtenuis (Abbayes) Hale & Culb., on soil, 2967, 35576

**Cladonia caroliniana* Schwein. *ex* Tuck. *s. lat.*, blanketing exposed, wet soil, 2962, 2964, 2965, 2968, 35577, 35599, 35612. New to Florida. This complex is badly in need of revision, mainly through field studies. "Typical" *Cladonia caroliniana* is a distinctly erect taxon containing squamatic acid. It probably is restricted to western North Carolina, northern Georgia and northern Alabama. Material from southern Georgia, Florida and the Central Highlands, etc. is mostly sprawling and contains only usnic acid. I have referred such material to *Cladonia dimorphoclada* Robbins on this basis. However, this latter species is generally understood to have slender podetia that are distinctly bent downwards and lacking squamatic acid with the exception of a single population from northern Alabama. Among the Rock Hill material, 35612 is quite erect but most are sprawling, while 35577 has downturned branches suggestive of *C. dimorphoclada*.

Cladonia cristatella Tuck., on rotting pine bark, 27165

Cladonia didyma (Fée) Vainio, barbatic acid, on rotting bark, 35608, barbatic and thamnolic acids, on plant remains, 35621

**Cladonia dimorphoclada* Robbins, on exposed, wet soil, 35616 Reported from Florida without location by Ahti (1973). Our collection has slender podetia but they are rather erect and is only tentatively assigned here. See discussion of *C. caroliniana*.

Cladonia grayi Merr. *ex* Sandst., on various organic substrates, 2910, 2947, 27147, 27148, 35598

Cladonia leporina Fr., on soil, 2956, 2957, 35604

Cladonia peziziformis (With.) Laundon, on soil, 2974, 35619

Cladonia polycarpia Merr., on soil, 2972, 2973, 35605, 35611

Cladonia ravenelii Tuck, on pine, 27129

Cladonia simulata Robbins, on soil, 2957

Cladonia strepsilis (Ach.) Vainio, on exposed, wet soil, 2959, 2960, 35600, 35615. New to Florida. Also recently collected in Holmes County.

Cladonia subradiata (Vainio) Sandst., on soil, 35603

**Pycnothelia papillaria* Dufour, on wet, exposed soil, 35592. New to Florida.

COCCOCARPIACEAE

Coccocarpia palmicola (Sprengel) Arvidsson & Galloway, on trunk of *Nyssa*, 2954

GOMPHILLACEAE

Gyalideopsis sp., on twig, 27139 Only hyphophores present. There are six or so corticolous species of *Gyalideopsis* in Florida which eventually will prove separable solely on the basis of their hyphophores.

GRAPHIDACEAE

Graphina abaphoides (Nyl.) Müll. Arg., trunk of *Quercus nigra*, 2913, on twigs, 27136

Phaeographis erumpens (Nyl.) Müll. Arg., on twig, 27122

HAEMATOMMATACEAE

Haematomma puniceum (Ach.) Massal., on *Quercus*, 2931, 27184

ICMADOPHILACEAE

Dibaeis baeomyces (L. *fil.*) Rambold & Hertel, on soil, 35620. New to Florida. Also recently collected in Santa Rosa County.

LECANORACEAE

**Carbonea latypizodes* (Nyl.) Knoph & Rambold ined., on rock, 27142, 27158, 27177, 35597, 35606, 35607

Lecanora caesiorubella Ach. ssp. *glaucomodes* (Nyl.) Imshaug & Brodo *s. lat.*, on branches, protocetraric acid, 2929, 35583, unknown substance, 27155

Lecanora cupressi Tuck., on lignum, 27130

Lecanora louisianae B. de Lesd., on twig, 35575

**Lecanora oreinoides* (Körber) Hertel & Rambold, on rock, 2909, 2950, 2952, 2953, 35593

Lecanora sp., on branch of *Quercus geminata*, 2917 Thallus and margin green-gray; disk black; hypothecium golden brown; atranorin, usnic acid, low amounts of other substances? I have not seen this taxon before.

*?*Lecanora*, on sides and underhangs of rock, abundant, 27186 A sterile crust with small, bullate/rugose areoles and slightly capitate soralia containing usnic acid and a substance unknown to me. It is placed here largely on the basis of chemistry. I cannot recall seeing this taxon in eastern North America previously.

**Lecidella viridans* (Flotow) Körber, on rock, 27149 The thallus is rather better developed than is apparently normal, which would lead one to *L. enterolucella* (Nyl.) Hertel, but the chemistry seems to be that of *L. viridans*.

Lecidella sp., on lignum, 27162

Pyrrhospora russula (Ach.) Hafellner, on twigs, 2928, 27154

LICHINACEAE

**Pyrenopsis* sp., on rock, 27176, 35582

MICAREACEAE

**Micarea cyrtidia* (Tuck.) ined., on lignum, 27124

MYCOCALICIACEAE

Chaenothecopsis sp., on lignum, 27172 Superficially similar to *C. savonica* (Räs.) Tibell but central hyphae of stalk dark and very much out of range.

MYCOPORACEAE

Mycoporum eschweileri (Müll. Arg.) ined., on twig, 27127

PARMELIACEAE

Bulbothrix confoederata (Culb.) Hale, on twigs, 2923A

Bulbothrix goebelii (Zenker) Hale, on rock, 35581

Bulbothrix isidiza (Nyl.) Hale, on branches of *Quercus geminata*, 2834, 2971

Canoparmelia caroliniana (Nyl.) Elix & Hale, on *Quercus geminata*, 2924

Canoparmelia cryptochlorophaea (Hale) Elix & Hale, on rock, 35584

Hypotrachyna livida (Taylor) Hale, on branches of *Quercus geminata*, 2923, 2933, 2951

Parmotrema dominicanum (Vainio) Hale, on rock, 35578

Parmotrema gardneri (Dodge) Serusiaux, trunk of *Quercus geminata*, 2955

Parmotrema hypoleucinum (Steiner) Hale, on twig, 27134

Parmotrema rampoddense (Nyl.) Hale, on *Vaccinium arboreum*, 2918

Parmotrema rigidum (Lynge) Hale, on branch of *Quercus geminata*, 2946

Parmotrema tinctorum (Nyl.) Hale, on *Quercus geminata*, 2922, 2969, on *Vaccinium arboreum*, 2925, on rock, 2945, 27152, 35588

Parmotrema ultralucens (Krog) Hale, on rock, 2940, 2944, 2961, 35594

Parmotrema xanthinum (Müll. Arg.) Hale, fatty acids only, on *Quercus geminata* 2949, on rock, 2939, 35579, fatty acids with gyrophoric acid, on rock, 2948, 27164, 35602

Pseudoparmelia sphaerospora (Nyl.) Hale, on *Quercus geminata*, 2920, on rock, 2926, 2937, 27151, 35613

Punctelia rudecta (Ach.) Krog, on rock, 2938, 35590

Rimelia reticulata (Taylor) Hale & Fletcher, on rock, 2916, 2941, 27146

Rimelia subisidiosa (Müll. Arg.) Hale & Fletcher, on rock, 2915, 35587

Usnea mutabilis Stirton, on *Quercus geminata*, 2914

Usnea strigosa (Ach.) A. Eaton, on *Quercus geminata*, 2912

**Xanthoparmelia conspersa* (Ach.) Hale, on rock, 2927, 2935, 27141, 27143, 27153, 27170, 27178, 35595, 35617. New to Florida. The material is variable from narrow lobed and tightly adnate to broad lobed and rather loose.

PERTUSARIACEAE

Ochrolechia africana Vainio, on branches, 2911, 27182

Pertusaria texana Müll. Arg., on branches, 2907, 27163

Pertusaria venosa Malme, on rock, 27145

Pertusaria xanthodes Müll. Arg., on twig, 27144

PHYSCIACEAE

Buellia curatellae Malme, on lignum, 27125, on twig, 35589

Buellia curtisii (Tuck.) Imshaug, on twig, 27135

Buellia imshaugiana R. C. Harris, on branch of *Quercus geminata*, 2930, 2932

**Buellia mamillana* (Tuck.) Weber, stictic acid, on rock, 27185

Buellia punctata (Hoffm.) Massal., on rock, 27174

**Buellia spuria* (Schaerer) Anzi, stictic acid, on rock, 35610

**Buellia* sp., on rock, 27181 Thallus of subsquamulose, green-yellow areoles, KC- but UV+ orange, ascospores *Buellia* type. Does not appear to be any species recorded for eastern North America or the Caribbean.

Hafellia bahiana (Malme) Sheard var. *pleiotropa* (Malme) Sheard, on twig, 27128

Heterodermia obscurata (Nyl.) Trevisan, on rock, 35591

Pyxine eschweileri (Tuck.) Vainio *s. lat.*, laminal soralia, on rock, 2963, 35586

PSORACEAE

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**Diploschistes actinostomus* (Pers.) Zahlbr., on rock, 27126, 27157, 35601, 35614

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Trapeliopsis flexuosa (Fr.) Coppins & P. James, on lignum, 27159, base of pine, 35585

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**Lepraria neglecta* (Nyl.) Lettau, on rock, 35580.

Acknowledgments. We wish to thank Greg Seamon of The Nature Conservancy for help in facilitating the field work and Angus Gholson., Jr. of Tall Timbers Research, Inc. for guiding us to the Rock Hill Preserve. Lewis Anderson identified Buck's *Sphagna*.

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Letter to the Editor from William A. Weber, Prof. Emeritus, University of Colorado Museum, January 1995.

Volume 11(4) 1994, pp. 121-130 included an article on the *Lichens and bryophytes of the Rochelle Hills, Campbell County, Wyoming*. Sole authorship was claimed by Alvin L. Medina. Although not credited to me, this paper was based on my report: *Inventory of the Cryptogamic Flora (Lichens and Bryophytes) of the Rochelle Hills in the SE Corner of Campbell County, Wyoming.* I submitted this 14 page report in 1975 to Dr. John Thilenius, Rocky Mountain Forest and Range Experiment Station, USFS, Laramie, Wyoming. In June, 1989, Mr. Medina wrote me stating the Experiment Station's interest in publishing the report, and saying "perhaps we could jointly coauthor the publication... I would very much appreciate your technical review of the manuscript." I responded favorably and provided corrections and additions. I received no further correspondence from Mr. Medina, saw no copy of a manuscript, and knew nothing further about the project until it appeared in *Evansia*. In the publication, no mention of my report was included. I was acknowledged only for my "assistance".

Reply from A. Medina, Research Ecologist, USDA Forest Service, Flagstaff, AZ, 1/26/95.

The author accepts full responsibility and apologizes for errors in the 'Acknowledgement' of said article. The 'Acknowledgement' should have read as follows with changes in italics: Thanks are *sincerely* expressed to Dr. William A. Weber, under contract to the USDA Forest Service, for *the* collection, identification, and photographing of specimens, *to include annotations and preparation of the report 'Inventory of the Cryptogamic Flora (Lichens and Bryophytes) of the Rochelle Hills in the SE Corner of Campbell County, Wyoming', which is the basis for this article.* The manuscript was prepared only after Dr. Weber wrote on November 24, 1992 and stated: "I see no reason why you can't go ahead and publish the report, as long as you give me credit for making the collections and preparing the list with whatever annotations I made to it, and for the set of color slides that I seem to remember submitting. I really don't care for joint authorship at all."

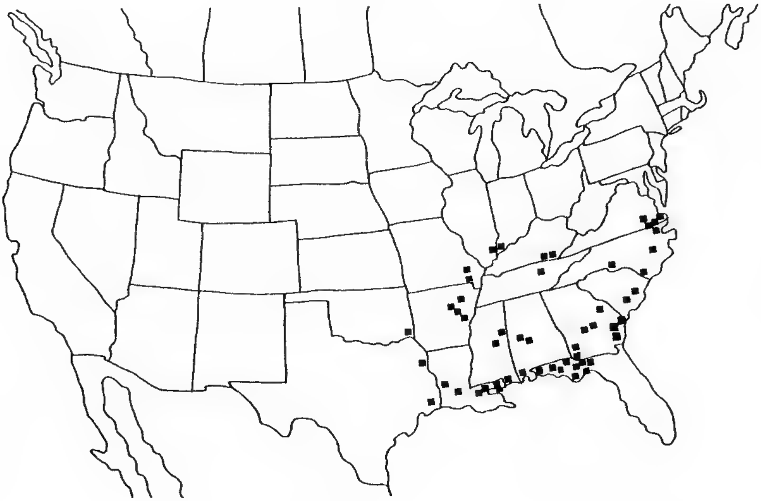
The distribution of *Brachelyma subulatum* (P. Beauv.) Schimp. ex Card. with notes on its paraphyllia

Bruce Allen[1]

Brachelyma is a monotypic genus (Fontinalaceae) found on trunks, branches, roots, logs, or stones in or along rivers, streams, creeks, or swamps. It is commonly semiaquatic, i.e. occurs in places that are submerged or inundated only during periods of high water. It can be found as a strict aquatic, but never with the luxuriant growth often associated with a semiaquatic habitat. It is incredibly variable in nearly all features.

Allen (Fontinalaceae Exsiccatae, Fasciculus 3, 1991) noted the presence of paraphyllia on *Brachelyma* stems and decurrent leaf bases. These structures are difficult to find in battered collections but can always be located on at least some leaf bases. They are best developed on robust plants that correspond to what has been called *B. robustum* (Card.) Britt. These collections have long decurrent leaves with uni- or biseriate paraphyllia on the decurrencies (single or double), scattered in groups on the stems (mostly near leaf decurrencies), or around branch primordia.

1 Missouri Botanical Garden, P.O. Box 299, St. Louis, Missouri 63166-0299



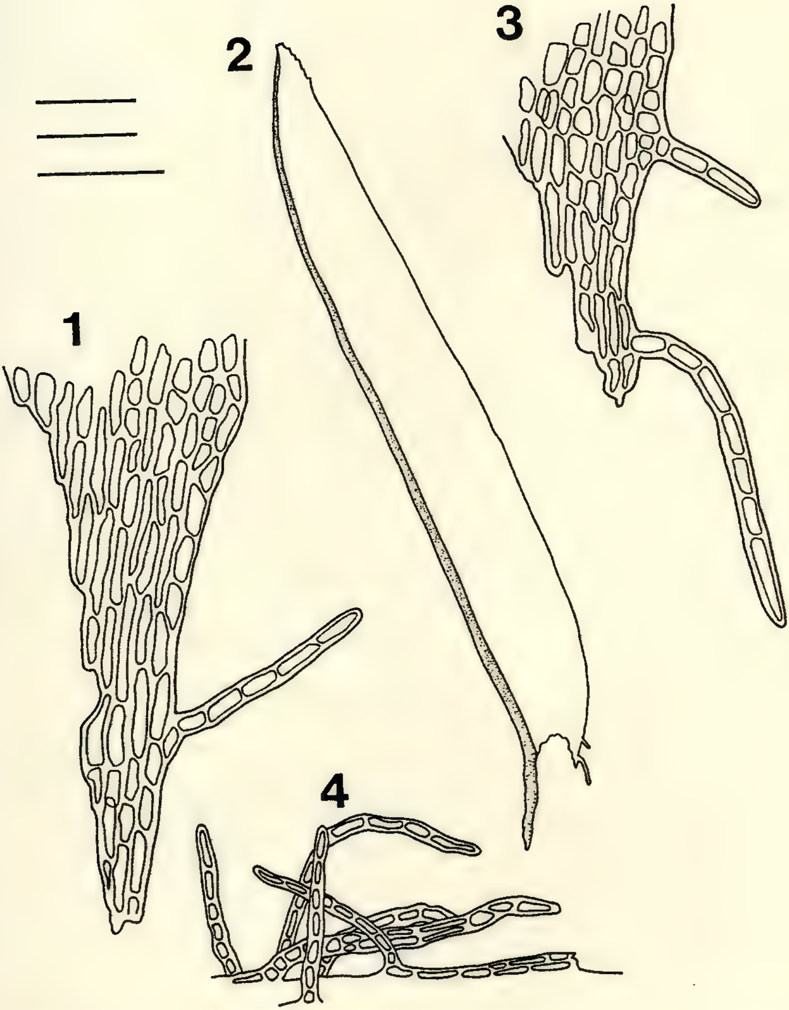


Figure 1. Brachelyma subulatum. 1. Leaf base with single paraphyllium. 2. Leaf with two paraphyllia at base. 3. Leaf base with two paraphyllia. 4. Group of paraphyllia on stem and one paraphyllium on leaf decurrency. Scales in mm: top = 0.05 (1,3); middle = 0.1 (4); bottom = 0.5 (2).

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The genus *Bryum* (Musci) in Maine.

Bruce Allen[1]

Bryum is a genus of small, erect mosses nearly always found on soil or humus. The plants often have a rosette growth form with the upper leaves larger and better developed than the lower leaves. Typically the leaves are bordered by linear cells, have large rhomboidal to oblong-rhomboidal laminal cells, and percurrent to excurrent costae. Their capsules are usually pendent, more or less pyriform, and have well-developed, often perfect, double peristomes. *Bryum* has a large number of species and is taxonomically difficult due to its small size, generally nondescript, often technical characters, and the tendency of leaves taken from different parts of single plants to have dissimilar morphologies. Groups of seemingly related species can sometimes be recognized, but as noted by Andrews (1940) a clear division into subgenera or sections is not indicated. Characters that are important in the taxonomy of *Bryum* are found in its leaf cells (upper leaf cell length vs. width; thickness of cell walls; basal leaf cell size and shape), costa length, leaf margins (degree of recurving, border development), sexuality, leaf decurrencies, capsule shape, and endostome form.

Bryum can be confused with *Pohlia* which has narrower, oblong-lanceolate, elimbate leaves with long, narrow leaf cells, and percurrent costae. Unfortunately character state variability in *Bryum* is such that it includes all of these features. However, while some *Bryum* species may exhibit one or more of the above features, only *Pohlia* species have them all.

Bryum Hedw. Sp. Musc. Frond. 178. 1801.

Plants small to robust dense or loose tufts, simple or forked. Leaves erect, erect-spreading, or spreading wet, oblong, oblong-lanceolate, oblong-ovate, obovate, ovate, ovate-lanceolate or elliptic, often decurrent, obtuse, acute or acuminate, concave; margins plane, erect, or recurved, entire or serrate near apex; cells smooth, thin- or thick-walled, quadrate to long-rectangular below, oblong, hexagonal, rhomboid elongate- rhomboid or fusiform above; costa strong,

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subpercurrent to excurrent. Setae elongate, straight or flexuose. Capsules subcylindrical, clavate, pyriform, subglobose or ovoid, nodding to pendent, symmetric or curved, smooth, neck well developed; opercula conic-apiculate; annulus large, compound, deciduous; stomata superficial; peristome double, exostome teeth 16, lanceolate, yellow to brown, papillose; endostome yellowish-hyaline, lightly papillose, basal membrane well-developed, segments keeled, narrowly or broadly perforate, cilia 2-3, nodose or appendiculate, rudimentary or absent. Calyptrae cucullate, smooth, naked. Spores spherical, smooth or papillose.

Key to the species of *Bryum* in Maine

1. Leaves shrunken and shriveled when dry, long decurrent, cells lax, thin-walled . . . . 11. *B. weigelii*
1. Leaves firm, not shriveled when dry, decurrencies present or absent, cells firm, thick- or thin-walled 2

   2. Leaves rounded-obtuse . . . . 7. *B. muehlenbeckii*
   2. Leaves acute to acuminate 3

3. Plants whitish to pale-green and silvery . . . . 2. *B. argenteum*
3. Plants green, yellow, brown or red 4

   4. Plants with brown, papillose propagulae in leaf axils 5
   4. Plants without propagulae in leaf axils 6

5. Leaf cells lax, thin-walled, margins weakly recurved below, plane above, costa variable, often ending below apex; brown, globose rhizoidal gemmae sometimes present . . . . 4. *B. capillare*
5. Leaf cells firm, thick-walled, margins tightly recurved throughout, costa percurrent to excurrent; rhizoidal gemmae absent 10. *B. pseudotriquetrum*

   6. Leaf cells lax, thin-walled and bulging, variable in size, cells more than and less than 3:1 often side by side, border weakly developed 7
   6. Leaf cells firm, thin- or thick-walled not noticeably bulging, most cells either more than or less than 3:1, border well-developed 8

7. Basal leaf cells long-rectangular, costa percurrent to short excurrent; capsule neck long, well differentiated neck . . . . 8. *B. pallens*
7. Basal leaf cells quadrate, costa variable, ending below apex, percurrent or short excurrent; capsule neck short, weakly differentiated . 4. *B. capillare*

8. Most upper leaf cells 3:1 or less 9
8. Most upper leaf cells greater than 3:1 10

9. Leaves decurrent, costa percurrent to short excurrent . . . . 10. *B. pseudotriquetrum*
9. Leaves not decurrent, costa short to long excurrent . . . . . 9. *B. pallescens*

10. Plants synoicous 11
10. Plants dioicous 12

11. Peristome with a short, deep orange-red fundus, yellow-brown above; cilia 1-3, rudimentary . . . . 1. *B. amblyodon*
11. Peristome yellow-brown throughout; cilia 2-3, appendiculate . . . . 6. *B. lisae* var. *cuspidatum*
12. Leaves 2-3 mm long, basal leaf cells elongate; capsules brown . . . . 3. *B. caespiticium*
12. Leaves 1.7-2.0 mm long, basal leaf cells quadrate; capsules purple-red . . . . 5. *B. dichotomum*

1. ***Bryum amblyodon*** C. Müll., Linnaea 42: 293. 1879.

Bryum stenotrichum C. Müll., Flora 70: 219. 1887.

Plants small, green, densely tufted, at times rosulate above, to 20 mm high; with reddish-brown, smooth or papillose rhizoids. Leaves 2-3 mm long, erect-patent dry, ovate-lanceolate below, oblong-lanceolate above, acuminate; margins revolute throughout, border broad, moderately developed; costa short or long excurrent; upper cells 40-60 µm x 3-4 µm, oblong-rhomboidal, becoming fusiform in apex, firm-walled, basal cells 80-110 µm x 16-24 µm, long-rectangular, firm-walled, at times pitted, reddish at base. Synoicous. Setae 10-20 mm long, red, flexuose dry. Capsules 2-3.5 mm long, elongate-pyriform, neck well-developed, pendent, light-brown; opercula 0.5 mm long, conic-apiculate; exostome teeth yellow-brown with short, dark red fundus, evenly papillose on dorsal surface, endostome light-yellow, basal membrane high,

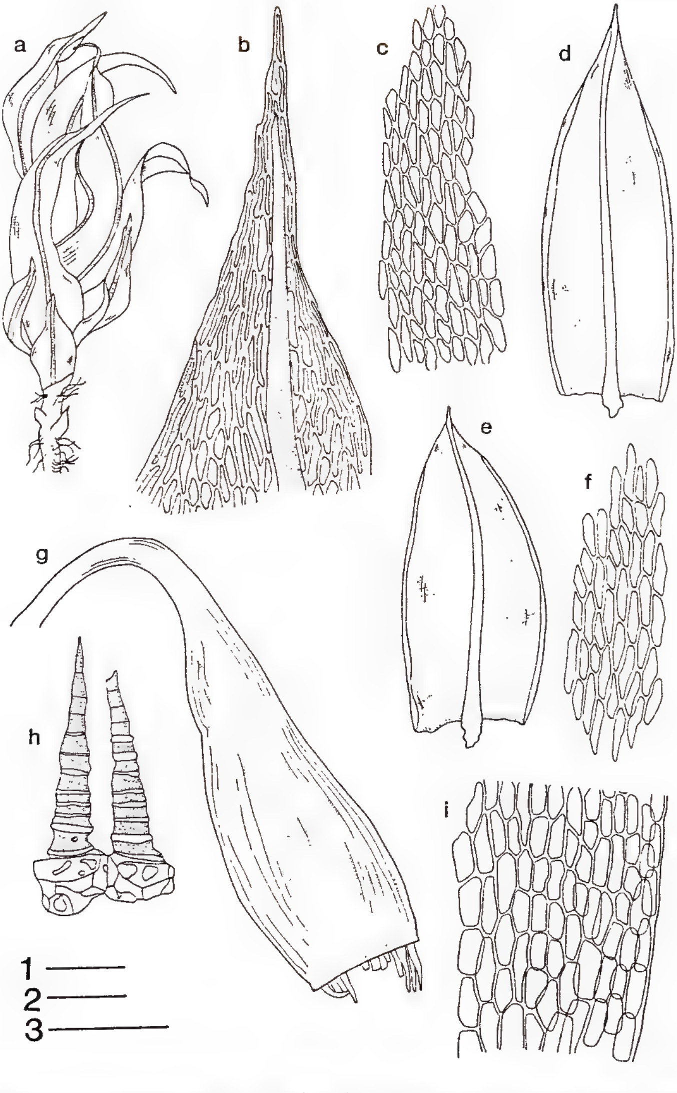

Figure 1. *Bryum amblyodon*. a. Habit. b. Leaf apex. c. Upper leaf cells. d & e. Leaves. f. Median leaf cells. g. Capsule. h. Exostome teeth, inner (ventral) surface. i. Basal leaf cells. Scales in mm: Bar 1 = 0.1 (b,c,f,h,i); Bar 2 = 0.5 (d,e,g); Bar 3 = 0.5 (a).

processes well-developed, broadly perforate, lightly papillose, cilia 1-3, rudimentary. Calyptrae falling early, cucullate, 2-4 mm long. Spores 22-32 μm, smooth to granulate.

On calcareous soil and cement along coast. In Maine known from Hancock (*Norton* MAINE), Knox (*Norton* MAINE), Lincoln (*Allen 10207* MO), Sagadahoc (*Norton* MAINE), and Washington (*Norton* MAINE) counties.

This species is better known in eastern North America as *B. stenotrichum* C. Müll. or *B. inclinatum* (Sw.) Sturm., an arctic to subarctic species previously reported from Maine by Andrews (1940). Ochi (1980) synonymized these names with *Bryum amblyodon*, an antipodal species. *Bryum amblyodon* is a calciphile and in Maine it is restricted to the sea coast where it is sometimes found on concrete sidewalks.

This species belongs to the bordered, long-celled group of *Bryum*, otherwise its nondescript gametophytes are nearly impossible to distinguish from *B. lisae* var. *cuspidatum* or *B. caespiticium*. It differs from both species in having rudimentary endostomial cilia and a short, dark-red fundus at the base of the exostome teeth. This fundus represents extra peristomal deposition and divisions in the primary peristomal layer. A much better developed fundus occurs in *B. algovicum* which has chambered exostome teeth that adhere to the base of the endostome.

2. ***Bryum argenteum*** Hedw., Sp. Musc. Frond. 181. 1801.

Plants small, silvery-green, in loose tufts, 3-10 mm high; rhizoids papillose, not matted. Leaves 0.5-1.3 mm long, imbricate, with recurved apices dry, imbricate wet, concave, broadly ovate, apiculate to filiform-acuminate; margins plane or recurved below, unistratose, not bordered, not decurrent; costa slender, ending below the apex, percurrent or excurrent; upper cells rhomboidal to rectangular, hyaline, firm-walled, basal cells sub-quadrate to short-rectangular, green, thick-walled. Asexual reproduction by short, compact, deciduous branches. Dioicous. Setae 8-15 mm long, brown to red. Capsules 1-2 mm long, oblong-cylindric, pendent, light brown becoming red with age, exothecial cells below the mouth strongly differentiated in 10 or more rows; opercula 0.5 mm long conic-apiculate, annulus compound and revoluble; exostome teeth light brown, papillose, 350 μm high, endostome yellowish to hyaline, 320 μm high, basal membrane high, processes broad, perforate, lightly papillose, cilia 2-3,

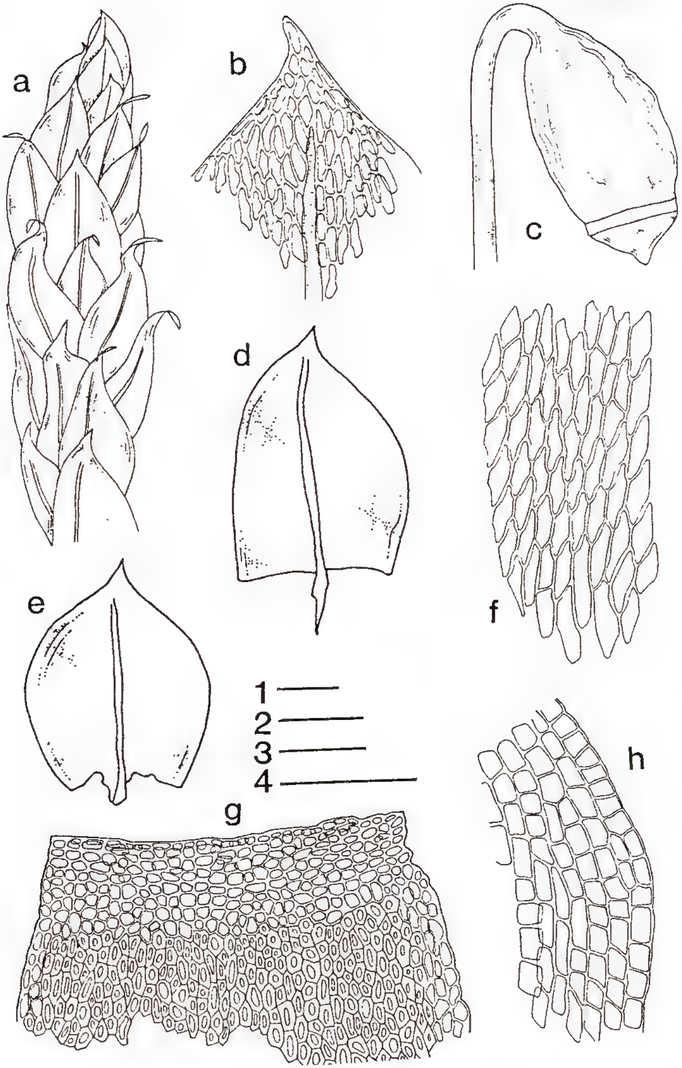

Figure 2. *Bryum argenteum*. a. Habit. b. Leaf apex. c. Capsule and opercum. d & e. Leaves. f. Median leaf cells. g. Capsule mouth. h. Basal leaf cells. Scales in mm: Bar 1 = 0.05 (f,h); Bar 2 = 0.1 (g); Bar 3 = 0.5 (b,c.); Bar 3 = 0.25 (d & e); Bar 4 = 0.5 (a).

perforate, lightly papillose, cilia 2-3, appendiculate. Calyptrae falling early, 1.2-1.5 mm long, cucullate, long-cylindrical. Spores 10-15 µm, smooth to faintly papillose.

Commonly found in weedy, disturbed places. On soil in dry and exposed areas or along paths in woods, crevices of rocks, boulders, and concrete sidewalks, logs, bricks, and roofs. In Maine known from Androscoggin (*Allen 14690* MO), Cumberland (*Blake* (MAINE), Knox (*Lowe* (MAINE), Lincoln (*Allen 10211* MO), Penobscot (*Merrill* (MAINE), Piscataquis (*Lowe* (MAINE), Sagadahoc (*Allen 14609* MO), and York (*Allen 13047* MO) counties. Also reported but not yet verified from Hancock (Schnooberger & Wynne 1941), Kennebec and Oxford (Parlin 1939), Waldo (Parlin 1924), and Washington (Spencer 1993) counties.

A common, weedy species, *B. argenteum* is an attractive silvery-green moss often associated with disturbed, anthropogenic habitats. Its silver color is due to the absence of chlorophyll in the upper parts of the leaves. It has a perfect peristome, strongly differentiated exothecial cells at the capsule mouth and short, julaceous stems that grow in dense, tight mats. Andrews (1940) considered this species unrelated to any other North America *Bryum*, but *B. dichotomum* appears similar in its leaf shape, quadrate basal leaf cells and purple-red capsules. That species, however, lacks a silver color and strongly differentiated exothecial cells.

3. ***Bryum caespiticium*** Hedw., Sp. Musc. Frond. 180. 1801.

Plants small to medium sized, yellowish-green, in dense tufts, rosulate above, 5-15 mm high; densely tomentose below, rhizoids papillose-roughened. Leaves 2-3 mm long, erect to erect-patent dry, ovate-lanceolate, acuminate; margins revolute to near the apex, indistinctly border; costa strong, long excurrent, serrulate; upper cells rhomboidal to fusiform, firm-walled, 40-60 µm x 8-12 µm, basal cells long-rectangular, firm-walled, 40-80 µm x 16 µm. Dioicous. Setae 20-40 mm long, red. Capsules 2.0-3.5 mm long, clavate to elongate-ovoid, constricted at neck, pendent; opercula conic, 0.5 mm long; exostome teeth yellow to yellow-brown, lightly papillose, endostome Pale yellow to hyaline, lightly papillose, basal membrane to 1/2 of exostome teeth length, processes long, broadly perforate, cilia 2-3, appendiculate. Calyptra not seen. Spores 12-16 µm, smooth.

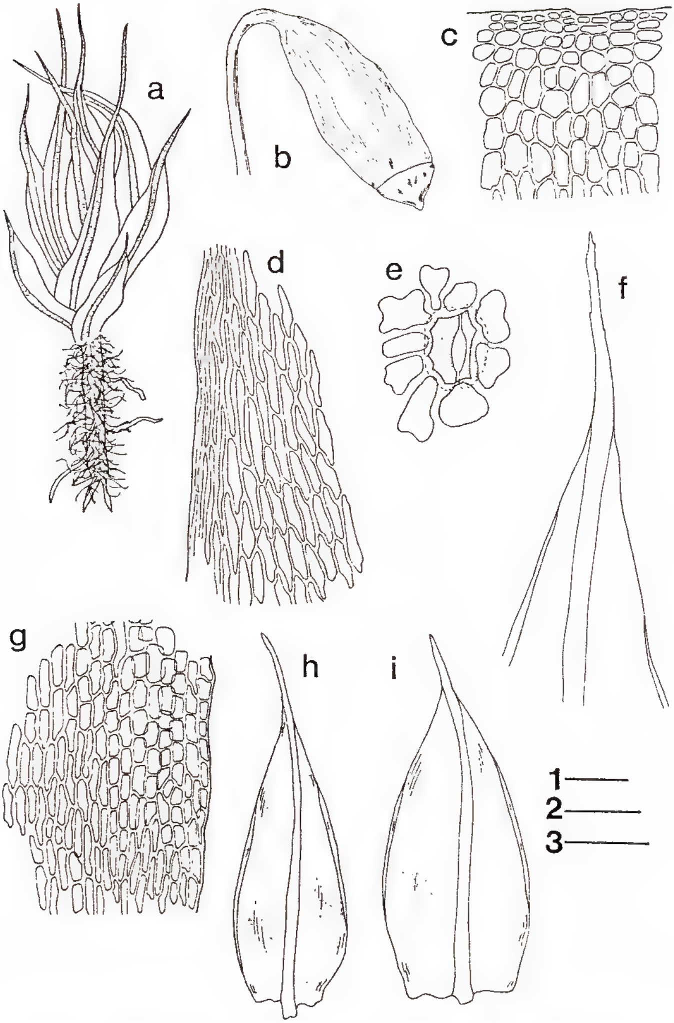

Figure 3. *Bryum caespiticum*. a. Habit. b. Capsule and operculum. c. Capsule mouth. d Upper leaf cells. e. Stomata. f. Leaf apex. g. Basal leaf cells at alar region. h & i. Leaves. Scales in mm: Bar 1 = 0.05 (d); Bar 2 = 0.05 (e); Bar 2 = 0.1 (c,g); Bar 2 = 0.2 (f); Bar 2 = 0.5 (h & i); Bar 2 = 1.0 (b); Bar 3 = 1.0 (a).

On bare soil, sometimes in full and direct sunlight. In Maine known from Androscoggin (*Lowe* MAINE), Cumberland (*Lowe* MAINE); Oxford (*Lowe* MAINE), Piscataquis (*Merrill 165* MAINE, MO), and Sagadahoc (*Allen 14589* MO) counties. Reported by not yet verified from Hancock (Patterson 1930), Kennebec (Parlin 1923, 1939, Pitman 1928), Washington (Parlin 1923), and Waldo (Parlin 1923) counties.

Bryum caespiticium has strongly recurved leaf margins, a long-excurrent costa, moderately developed leaf limbidia, and a perfect peristome. Its leaf cells are firm-walled throughout, long-rectangular at base and fusiform above. *Bryum pallescens* differs in having shorter upper leaf cells, short excurrent costae, and quadrate to short-rectangular basal leaf cells. *Bryum lisae* var. *cuspidatum* is very similar, it differs from *B caespiticium* differs only in being synoicous.

4. ***Bryum capillare*** Hedw. Sp. Musc. Frond. 182. 1801.

Plants small, dark-green above, reddish-brown below, tufted, rosulate above, 6-10 mm high; densely tomentose. Leaves 1.5-3.0 mm long, contorted or twisted dry, erect-spreading moist, from a narrow base obovate to elliptic, abruptly cuspidate or awned; margins plane to weakly recurved, serrulate above, border hyaline or pale-brown, weakly to moderately developed of 1-2(-3) rows of cells; costa variably developed, strong at base, ending below the apex, percurrent or excurrent; upper cells broadly hexagonal to rhomboidal, lax and thin-walled, 36-52 µm x 16-24 µm, basal cells quadrate to short-rectangular, lax, 48-60 µm x 24-28 µm. Brown, filiform, roughened propagulae often clustered in leaf axils, rhizoidal propagulae occasionally present. Dioicous. Setae 10-30 mm long, reddish-brown. Capsules 2.5-4 mm long, clavate, horizontal to inclined; opercula conic-apiculate; exostome teeth yellow-brown, papillose, endostome yellowish-hyaline, basal membrane to 1/2 of exostome teeth length, processes broadly perforated, lightly papillose, cilia 1-4, appendiculate. Spores 8-15 µm, lightly roughened.

On rock, soil or humus, also on bark of trees and decayed wood. In Maine known from Cumberland (*Preston* MAINE), Kennebec (*Allen 15714* MO), Oxford (*Parlin 8127* MO), Washington (*McCleary* MO), and York (*Lowe* MAINE) counties. Reported by not yet verified from Hancock (Patterson 1930, Greenwood 1927), and Waldo (Parlin 1929) counties. A report of the species from Somerset county (Allen 1991) is based upon a specimen of *Pohlia*.

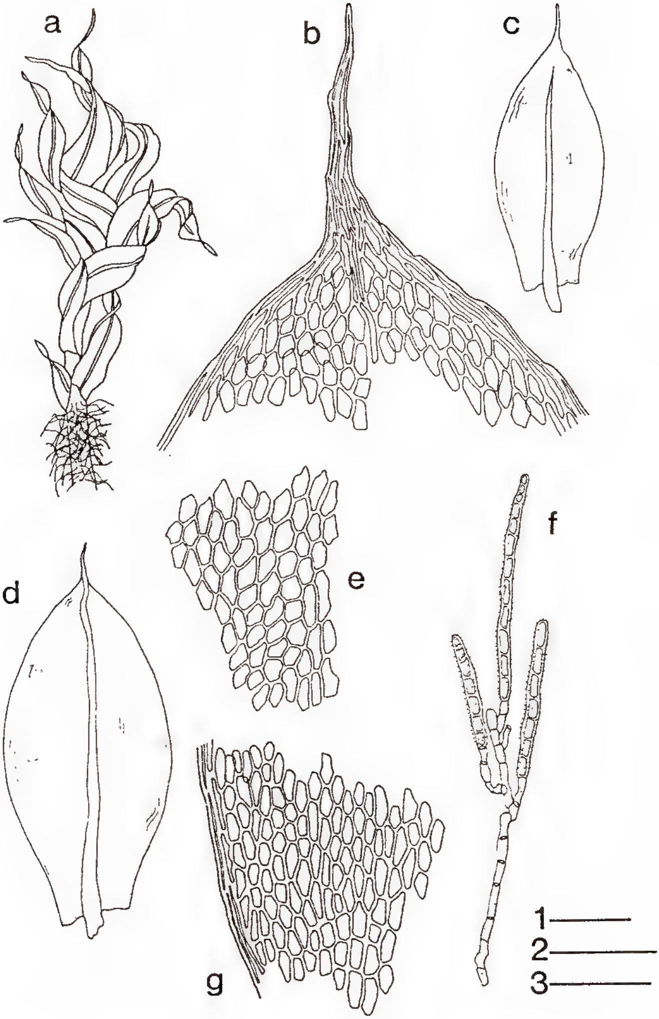

Figure 4. *Bryum capillare*. a. Habit. b. Leaf apex. c & d. Leaf. e. Median leaf cells. f. Filamentous propagulae. g. Basal leaf cells. Scales in mm: Bar 1 = 0.1 (b,e); Bar 1 = 0.2 (f); Bar 1 = 0.5 (c & d); Bar 2 = 0.2 (g); Bar 3 = 0.8 (a).

Bryum capillare is a soft looking moss with leaves that are contorted to spirally twisted leaves when dry. It has more or less plane leaf margins, a weakly developed border that nevertheless extends into the apex, and lax, thin-walled, generally short leaf cells. The costa is extremely variability in this species and often a single plant can have some leaves with subpercurrent, percurrent, or excurrent costae. *Bryum capillare* often has abundant reddish-brown, filiform propagulae in its upper leaf axils. *Bryum pseudotriquetrum*, the only other Maine *Bryum* with axillary propagulae, is a larger plant with firm-walled leaf cells and strongly recurved, dark red leaf margins.

Bryum pallens and *B. capillare* have lax leaf cells that vary considerably in size, the former differs in having consistently excurrent costae, long-rectangular basal leaf cells, and capsules with strongly differentiated necks.

Syed (1973) treated the *B. capillare*-complex in detail, with particular emphasis on axillary propagulae and rhizoidal tuber characters. Most Maine material of *Bryum capillare* sensu lato appears to represent *B. flaccidum* Brid. a species with papillose axillary propagulae, dark brown rhizoidal tubers, and a costa that is broad below but narrow at apex. However, there are some collections that appear identical to the above material but lack axillary propagulae and/or rhizoidal tubers. Crum and Anderson (1981) give a key to Syed's *capillare*-segregates from eastern North America.

5. ***Bryum dichotomum*** Hedw., Sp. Musc. Frond. 183. 1801.

Bryum atropurpureum Bruch & Schimp. in B.S.G., Bryol. Eur. 4: 143. 1839.

Bryum bicolor Dicks., Pl. Crypt. Brit., fasc. 4, p. 16. 1801.

Plants small, yellow-green in loose tufts to 5 mm high; rhizoids dense at base. Leaves 1-1.7 mm long, erect-imbricate, firm dry, erect-spreading wet, ovate to ovate-lanceolate, acuminate; margins recurved, entire, indistinctly bordered; costa percurrent to short excurrent; upper cells elongate-rhomboidal, thick-walled, 28-60 µm x 8-12 µm, basal cells quadrate to short-rectangular, firm-walled, 16-28 µm x 16 µm. Dioicous. Setae 5-10 mm long, red or purple. Capsules 1-3 mm long, purple-red, obovate to oblong-cylindrical, pendent; annulus compound; opercula 0.5 mm long, conic apiculate; exostome teeth yellow-brown, papillose, endostome yellowish-hyaline, basal membrane to 1/2 of exostome teeth length,

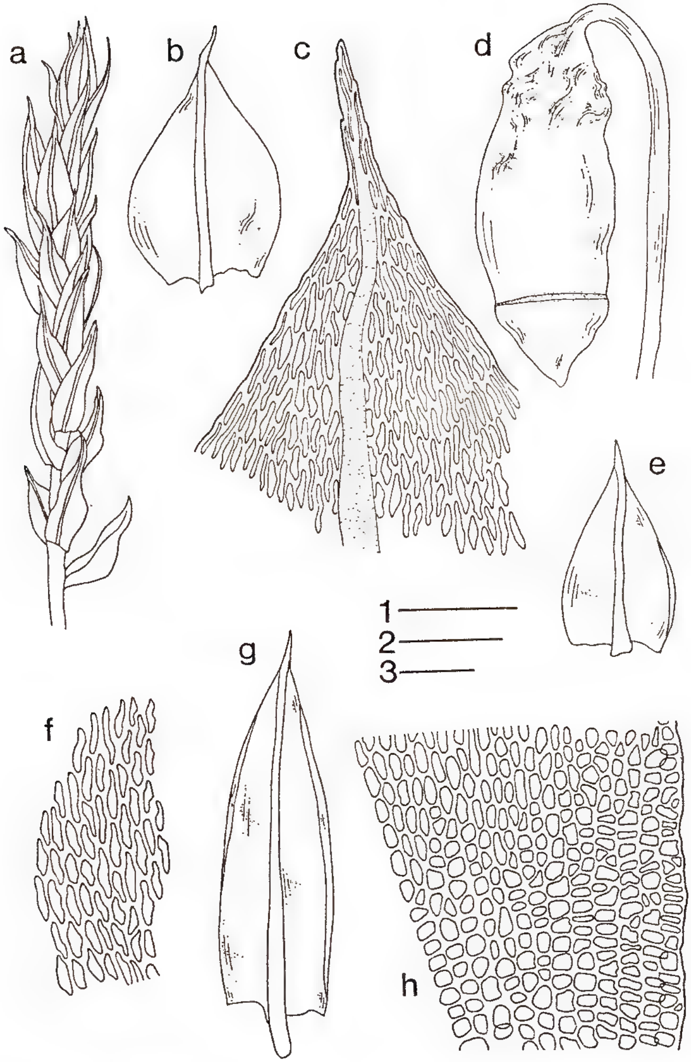

Figure 5. *Bryum dichotomum*. a. Habit. b,e,g. Leaves. c. Leaf apex. d. Capsule and operculum. f. Median leaf cells. h. Basal leaf cells. Scales in mm: Bar 1 = 0.1 (f,h); Bar 1 = 0.5 (b,e,g); Bar 2 = 0.1 (c); Bar 2 = 0.5 (d); Bar 3 = 1.0 (a).

processes well developed, broadly perforate, lightly papillose, cilia 2-4, nodose to weakly appendiculate. Spores 8-12 µm, lightly roughened.

On bare soil. In Maine known from York (*Carlson & Lowe* MAINE) county.

Bryum dichotomum, better known in eastern North America as *B. bicolor*, is a small *Bryum* with short broad leaves, and purple-red capsules. Its leaf cells, firm-walled throughout, are long above but short-rectangular to quadrate below. *Bryum argenteum* has a similar size and leaf shape as well as quadrate, firm-walled basal leaf cells. It differs in its silvery color and in having 10 or more rows of differentiated exothecial cells at the capsule mouth.

6. ***Bryum lisae*** De Not. var. ***cuspidatum*** (Bruch & Schimp. in B.S.G.) Marg., Lindbergia 1: 125. 1973.

Bryum bimum var. *cuspidatum* Bruch & Schimp. in B.S.G., Bryol. Eur. 4: 120. 1839. *Bryum cuspidatum* (Bruch & Schimp. in B.S.G.) Schimp. Syn. Musc. Eur., ed. 2: 430. 1876, *non* (Hedw.) Crome.

B. creberrimum Tayl., London J. Bot. 5: 54. 1846.

Plants small to medium, green to yellowish-green, tufted, rosulate above, 15-20 mm high; rhizoids sparse. Leaves 2-3 mm long, erect-contorted dry, erect-spreading wet, ovate-lanceolate, long-acuminate; margins recurved to near the apex, border weakly developed; costa long excurrent; upper cells rhomboidal, 40-50 µm x 12 µm, firm-walled, basal cells rectangular, 50-80 µm x 16 µm, thin-walled, lax. Synoicous. Setae 10-40 mm long, flexuose, reddish. Capsules 2-4 mm long, clavate, constricted at neck, horizontal, inclined or pendent; opercula 0.5 mm long, conic-apiculate; exostome teeth yellow-brown, finely papillose, endostome basal membrane yellowish-hyaline, to 1/2 of exostome teeth length, processes long, broadly perforated, lightly papillose to smooth, cilia 3-4, appendiculate. Calyptrae not seen. Spores 12-16 µm, lightly papillose.

On sandy soil in woods, rotting wood, or on boulders in and along streams. In Maine known from Androscoggin (*Allen 14712* MO), Aroostook (*Norton & Copeland* MAINE), Cumberland (*Hodgkins* MAINE), Hancock (*Merrill*

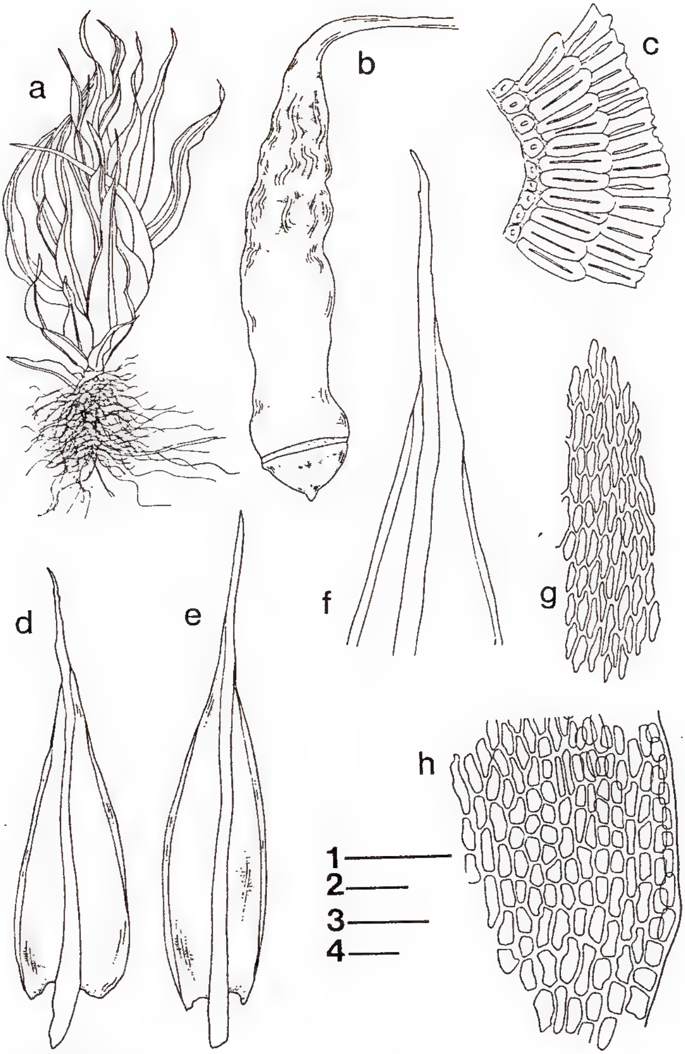

Figure 6. *Bryum lisae* var. *cuspidatum*. a. Habit. b. Capsule and operculum. c. Part of revoluble annulus. d & e. Leaves. f. Leaf apex. g. Upper leaf cells. h. Basal leaf cells. Scales in mm: Bar 1 = 0.1 (g,h); Bar 1 = 0.5 (d,e); Bar 2 = 0.05 (c); Bar 2 = 0.5 (b); Bar 3 = 0.2 (f); Bar 4 = 0.7 (a).

MAINE), Knox (*Norton & Fanning* MAINE), Oxford (*Holmes 5* MO), Piscataquis (*Smith* MAINE), Sagadahoc (*Allen 14584* MO), Washington (*Norton* MAINE), and York (*Lowe* MAINE) counties. Reported by not yet verified from Waldo county (Parlin 1924).

Bryum lisae var. *cuspidatum* has broadly ovate-lanceolate leaves with strongly recurved, sometimes dark red, margins. It has noticeably excurrent costae, long-rhomboidal upper leaf cells and elongate basal leaf cells. It is synoicous and so fruits abundantly, it has bright red setae, thick, pendent capsules, and a perfect peristome. *Bryum caespiticum* differs from *B lisae* var. *cuspidatum* only in its dioicous sexual condition.

7. **Bryum muehlenbeckii** Bruch & Schimp. in B.S.G., Bryol. Eur. 4: fasc. 32, 1846.

Plants medium to large, reddish-green to reddish-brown, densely tufted, to 45 mm high; rhizoids sparse. Leaves 2-3 mm long, erect-imbricate dry, erect to erect-spreading wet, oblong-ovate, concave, rounded-obtuse to bluntly acute, at times cucullate; margins plane, or erect to weakly reflexed below, border weakly differentiated; costa strong, thick at base, percurrent to subpercurrent; upper cells rhomboidal to elongate, 30-70 µm x 8-10 µm, thin or thick-walled, basal cells long-rectangular, 46-90 µm x 14 µm, thick-walled, cells at alar regions deep red, enlarged, bulging, quadrate to short-rectangular, 20-36 µm x 16 µm. Dioicous. Setae 20 mm long, red. Capsules to 3 mm long, obovate-pyriform, pendent; opercula 0.5 mm long, concave-apiculate; exostome teeth brownish-yellow, with a short, dark red fundus, papillose, endostome yellow-brown, basal membrane to 1/2 of exostome teeth length, processes slender, narrowly perforate, papillose, cilia 2-3, appendiculate. Spores 15-18 µm, lightly papillose.

On rocks in or along streams. In Maine known from Hancock (*Allen 3696* MO) county. Parlin (1939) reported this species from Oxford county, but the collection on which the report was based is *Bryum pseudotriquetrum*.

Bryum muehlenbeckii is an aquatic or semi-aquatic moss with a deep reddish color and broadly acute to obtuse leaf apices. Its leaves have short, dark red, enlarged and bulging alar cells that often extend below the leaf insertions. The species is very similar to *B. miniatum* Lesq. which is supposedly a larger moss with longer, thicker walled leaf cells, and less recurved leaf margins. The two

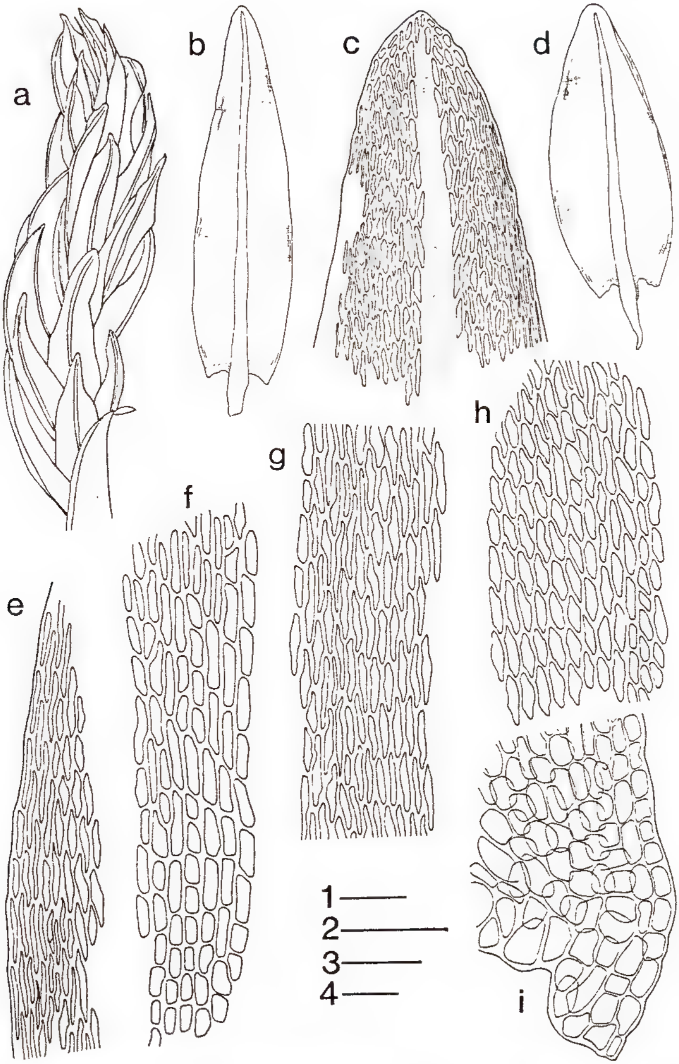

Figure 7. *Bryum muehlenbeckii.* a. Habit. b & d. Leaves. c. Leaf apex. e. Marginal leaf cells. f. Basal leaf cells. g & h. Median leaf cells from different leaves. i. Alar cells. Scales in mm: Bar 1 = 0.05 (i); Bar 2 = 0.1 (e-h); Bar 3 = 0.1 (c); Bar 3 = 0.5 (b,d); Bar 4 = 1.0 (a).

species are doubtfully distinct since they exhibit intergrading variation in all of these features. The single collection from Maine has the leaf size and weakly recurved leaf margins of *B. miniatum*, but astonishingly variable leaf cells. On a single stem some leaves have cells that match those of *B. miniatum* while other leaves have the cells of *B. muehlenbeckii. Bryum alpinum* differs from *B. muehlenbeckii* in having leaf margins recurved nearly to the apex and very long leaf cells (7:1).

8. ***Bryum pallens*** Sw. Monthly Rev. 34: 538. 1801.

Plants small, green to yellowish-green, densely or loosely tufted, rosulate, 5-30(-50) mm high, stems red; rhizoids sparse. Leaves 2-3 mm long, erect-twisted or erect-spirally contorted dry, erect-spreading wet, oblong to oblong-lanceolate, acute or gradually acuminate, decurrent; reflexed to near the apex, border strongly developed; costa reddish at base, yellow above, shortly excurrent; upper cells irregularly rhomboidal to elongate-rhomboidal, thin-walled, 30-50 µm, basal cells long- rectangular, lax and thin-walled, 40-90 µm. Dioicous. Setae red, 10-50 mm long. Capsules yellow-brown, 2.5-4 mm long, elongate-pyriform, with strongly differentiated neck, subpendant; opercula conic-apiculate; exostome teeth yellow, finely but densely papillose, endostome hyaline, basal membrane to 1/2 of exostome teeth length, processes long, narrowly perforated, smooth to lightly papillose, cilia 2, appendiculate. Spores 18-24 µm, lightly papillose.

On rocks and humus along stream or lake margins, and on rocks in streams. In Maine known from Androscoggin (*Allen 14729* MO), Aroostook (*Lowe* MAINE), Knox (*Norton* MAINE), Oxford (*Allen 10072*), and Somerset (*Allen 9287B*) counties. Reported but not yet verified from Hancock (Patterson 1930) and Piscataquis (Hermann 1970) counties.

The cilia in *B. pallens* can apparently vary from fully developed to almost lacking. The collections from Maine have well-developed cilia and so come out with difficulty in keys to *Bryum* (Andrews 1940, Crum and Anderson 1981) that rely primarily on the rudimentary character state. In *B. pallens* the capsules have long, constricted necks, the leaf cells are lax, and the leaf border is strongly differentiated. *Bryum capillare* differs in having quadrate to short-rectangular basal leaf cells and a variably developed costa that often ends below the apex. *Bryum pallescens* is an autoicous species with firm-walled leaf cells, short-rectangular to quadrate basal leaf cells, and non-decurrent leaves.

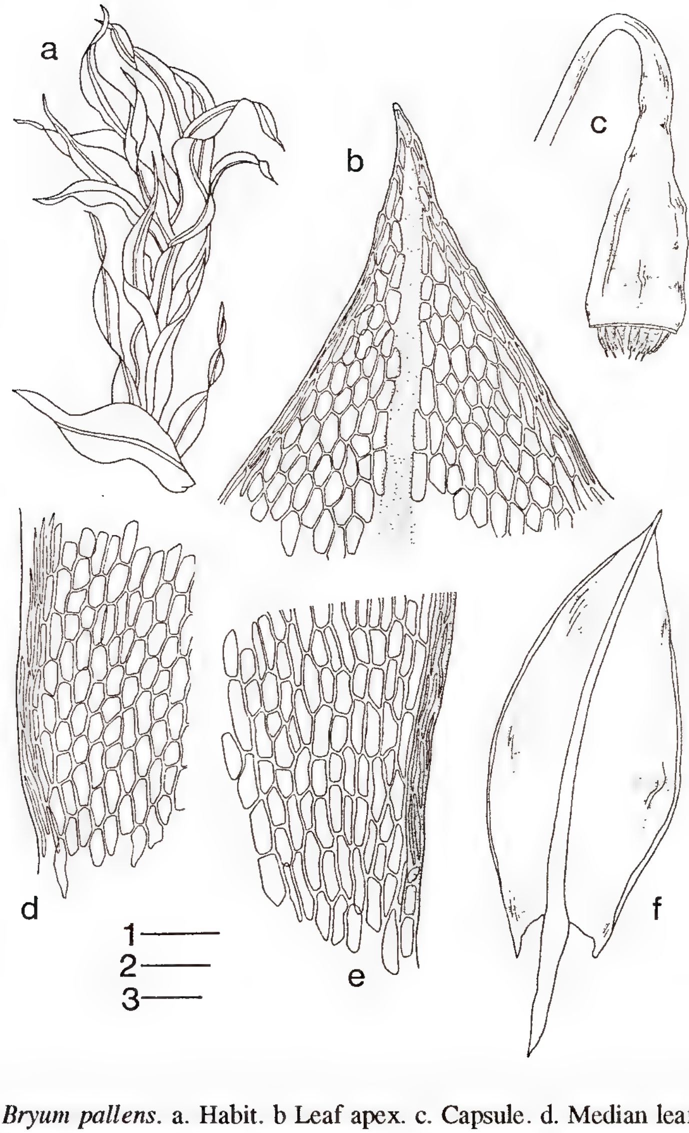

Figure 8. *Bryum pallens*. a. Habit. b Leaf apex. c. Capsule. d. Median leaf cells and margin. e. Basal leaf cells and margin. f. Leaf. Scales in mm: Bar 1 = 0.1 (b,d,e); Bar 1 = 0.5 (c); Bar 2 = 1.0 (a); Bar 3 = 0.5 (f).

Since Swartz provided an indirect reference to a previously published description of *Bryum pallens* the species epithet is attributed him rather than Bridel (see Anderson et al. 1990) under Article 32.4 of the International Code of Botanical Nomenclature (Greuter 1994).

9. ***Bryum pallescens*** Schleich. ex Schwaegr., Suppl. Sp. Musc. Frond. Suppl. 1(2): 107. 1816.

Plants medium sized, green to yellow-green, in loose or dense tufts, 1-3 cm high; rhizoids dense below. Leaves 1.5-3 mm long, spirally twisted dry, erect-spreading moist, ovate to ovate-lanceolate, long acuminate, not decurrent; margins revolute nearly to the apex, border well developed; costa long excurrent; upper cells oblong-hexagonal, firm-walled, 28-50 µm x 14-24 µm, basal cells short-rectangular to quadrate especially near the margins, firm-walled, 30-40 µm x 15-18 µm. Autoicous or synoicous. Setae 20-40 mm long, red-brown. Capsules 3-4 mm long, clavate, constricted at neck pendent; opercula conic-apiculate, 0.5 mm long; exostome teeth brown to yellowish- brown, papillose, endostome hyaline to yellowish, basal membrane to 1/2 of exostome teeth length, processes broadly perforated, smooth to lightly papillose, cilia 2-3, nodose or appendiculate. Spores 18-36 µm, papillose.

In moist places on soil, over rocks, and in rock crevices. In Maine known from Oxford (*Parlin 11697* NY), and Washington (*Norton* MAINE) counties. Reported but not yet verified from Piscataquis county (Kennedy and Collins 1901).

Bryum pallescens has broad leaves with strongly revolute leaf margins, short leaf cells, and a long excurrent costa. It is generally autoicous with male and female inflorescences at the ends of separate branches, but occasionally it is synoicous. *Bryum pseudotriquetrum* differs from it in having decurrent leaves, a short excurrent costa and generally synoicous inflorescences. *Bryum pallens* is a dioicous species with decurrent leaves, laxer, thin-walled leaf cells, and long rectangular basal cells. This species is sometimes confused with *B. lisae* var *cuspidatum*, but that species is consistently synoicous, has upper leaf cells greater than 3:1 and smaller (14-16 µm), finely papillose spores.

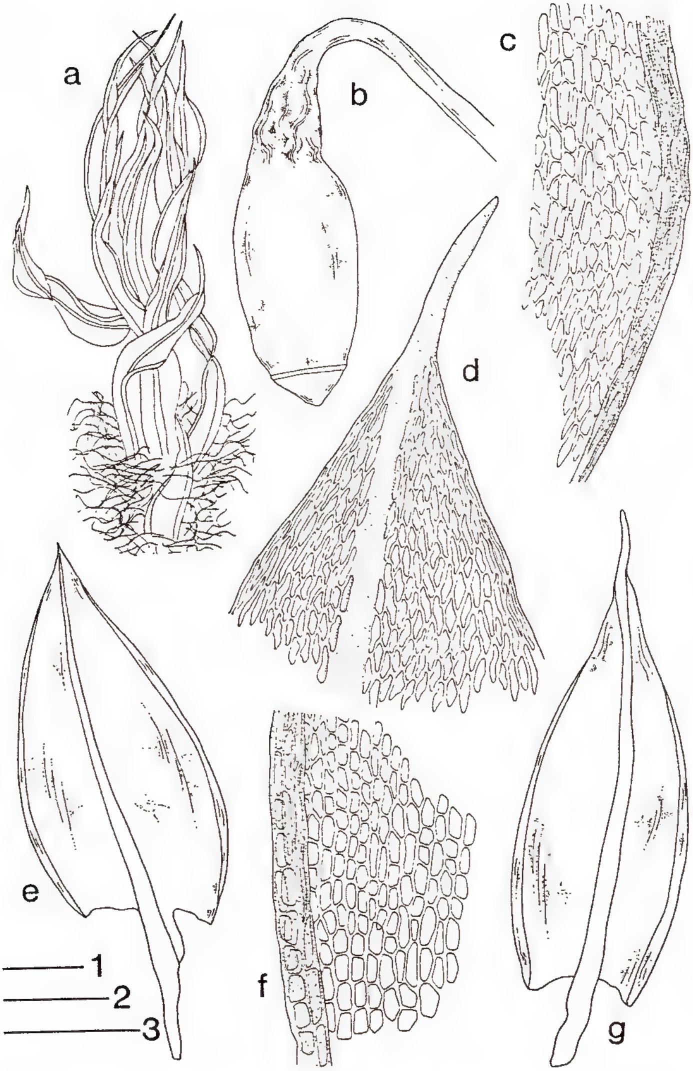

Figure 9. *Bryum pallescens*. a. Habit. b. Capsule and operculum. c. Median leaf cells and margin. d. Leaf apex. e. & g. Leaves. f. Basal leaf cells and margin. Scales in mm: Bar 1 = 0.1 (c,d,f); Bar 1 = 0.5 (b); Bar 2 = 0.5 (e,g); Bar 3 = 1.0 (a).

10. ***Bryum pseudotriquetrum*** (Hedw.) Gaertn., Mey Scherb., Oekon.-Techn. Fl. Wetterau, 3(2): 102. 1802. *Mnium pseudotriquetrum* Hedw., Sp. Musc. Frond. 190. 1801.

Mnium bimum Brid., Muscol. Rec. 3: 93. 1803. *Bryum bimum* (Brid.) Turn. Musc. Hib. 127. 1804.

Plants large, dark-green, reddish or yellowish green, densely tufted, 10-30 mm high; reddish-brown rhizoids densely matted below. Leaves 2-3.5 mm long, erect-spreading to spreading, twisted and contorted dry, erect-spreading wet, oblong-lanceolate to ovate-lanceolate, acute to gradually acuminate, distinctly decurrent; margins tightly recurved often to near the apex, border well-developed, often red; costa, percurrent to short excurrent; upper cells hexagonal to hexagonal-rhomboidal, firm-walled, 20-46 μm x 10-20 μm, basal cells quadrate to rectangular, firm-walled, porose-pitted. Plants at times with filamentous, brown brood bodies in upper leaf axils. Synoicous or dioicous. Setae 20-40 mm long, reddish, becoming brown with age. Capsules 2.5-4 mm long, cylindrical to clavate, horizontal, inclined or pendent; opercula conic-apiculate, 0.5-0.8 mm long; exostome brownish-yellow to pale-yellow, papillose, endostome yellowish-hyaline, basal membrane to 1/2 of exostome teeth length, processes long, perforations broad, lightly papillose, cilia 2-3, appendiculate. Spores 12-20, lightly papillose.

On humus in moist seepy areas, drainage ditches and in crevices of cliffs. In Maine known from Androscoggin (*Allen 14674*), Aroostook (*Lowe* MAINE), Cumberland (*Norton* MAINE), Hancock (*Rand* MAINE), Kennebec (*Carlson* MAINE), Oxford (*Parlin 11662* NY), Penobscot (*Merrill 125* MO), and Washington (*Holmes 135*) counties. Reported but not yet verified from Piscataquis (Kennedy & Collins 1901) and Waldo (Parlin 1924, 1939) counties.

Bryum pseudotriquetrum is a large *Bryum* with distinctly decurrent leaves, strongly recurved, often dark-red margins, short, firm-walled leaf cells, and a percurrent or short-excurrent costa. *Bryum capillare* and *B. pallens* differ from it in having lax, bulging leaf cells, while *B. pallescens* differs in having long excurrent costae and non-decurrent leaves. *Bryum lisae*. var. *cuspidatum* and *B. caespiticum* are somewhat smaller mosses with longer upper leaf cells and long-excurrent costae.

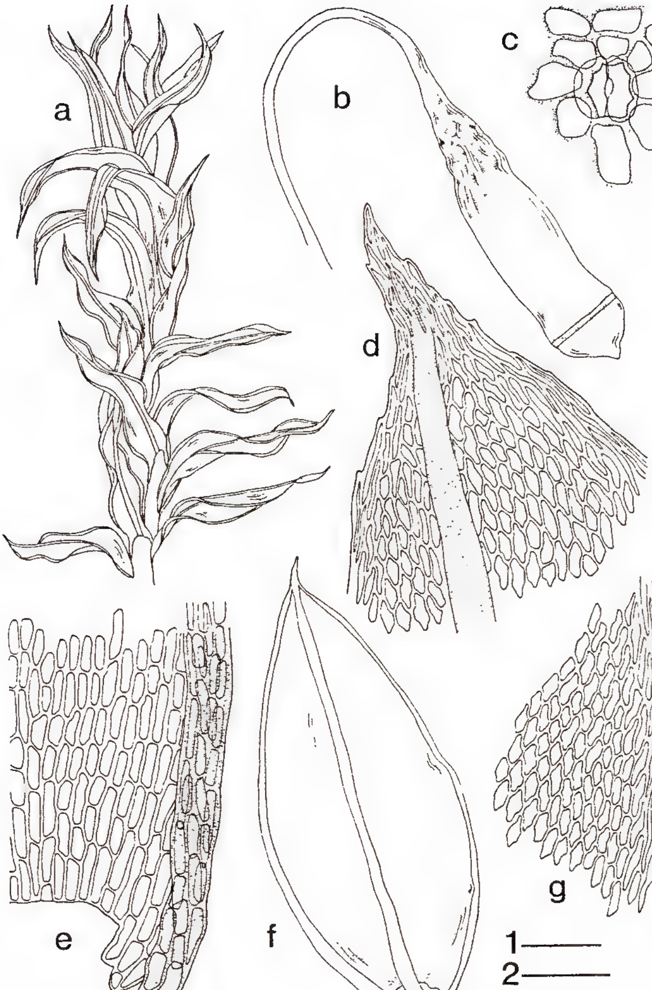

Figure 10. *Bryum pseudotriquetrum*. a. Habit. b. Capsule and operculum. c. Stomata. d. Leaf apex. e. Basal leaf cells and margin. f. Leaf. g. Median leaf cells and margin. Scales in mm: Bar 1 = 0.05 (c); Bar 1 = 0.1 (d,e,g); Bar 1 = 0.5 (f); Bar 2 = 1.0 (b); Bar 3 = 1.0 (a).

11. ***Bryum weigelii*** Spreng., Mant. Prim. Fl. Halens. Add. p. 55. 1807.

Plants large, pale-green to yellowish-green, in soft, loose tufts, 30-50 mm high; rhizoids sparse. Leaves 2-3 mm long, widely spaced, soft, shriveled and twisted dry, erect-spreading wet, ovate to ovate-lanceolate, long-decurrent, acute to short-acuminate; margins plane or weakly recurved below, border indistinct; subpercurrent to percurrent; upper cells irregularly oblong-hexagonal, lax and thin-walled 30-50 µm x 12-24 µm, basal cells irregularly rectangular, lax and thin-walled, 34-60 µm x 14-24 µm. Dioicous. Setae 35-45 mm long, red. Capsules 3 mm long, pyriform, pendent; opercula conic-apiculate, 0.5 mm long; exostome brownish-yellow, papillose, endostome yellowish-hyaline, basal membrane to 1/2 of exostome teeth length, processes long, perforations broad, lightly papillose, cilia 2-3, appendiculate. Spores 10-14, lightly papillose.

On soil and rock along stream margins, in seepage areas or in springs. In Maine known from Aroostook (*Lowe* MAINE), Cumberland (*Lowe* MAINE), Oxford (*Bacon 391* NY) and Piscataquis (*Faxon 259* NY) counties.

Bryum weigelii has elongated stems with pale, widely spaced, soft, contorted, very long-decurrent leaves. Despite its widely spaced leaves the leaf decurrencies in this species often extend into the axils of the leaves next below. Its costae are often subpercurrent, its leaf cells lax, thin-walled, and frequently bulging, and its margins are plane and indistinctly bordered. Although no other Maine *Bryum* is comparable to it, as noted by Andrews (1940) "Elongated sterile forms of various other species showing slightly decurrent leaves are often confused with it."

Syed (1973) reported *B. stirtonii* Schimp. from Maine, but the specimen on which the report is based came from Montana ("near Columbia Falls, altitude 4000 ft, May, Aug. 1896, R. S. Williams").

Parlin (1939) reported *Bryum schleicheri* Lam. & DC, a western species otherwise unknown in eastern North America, from Androscoggin county (North Turner, 1928). The specimen on which this report was based has not been seen.

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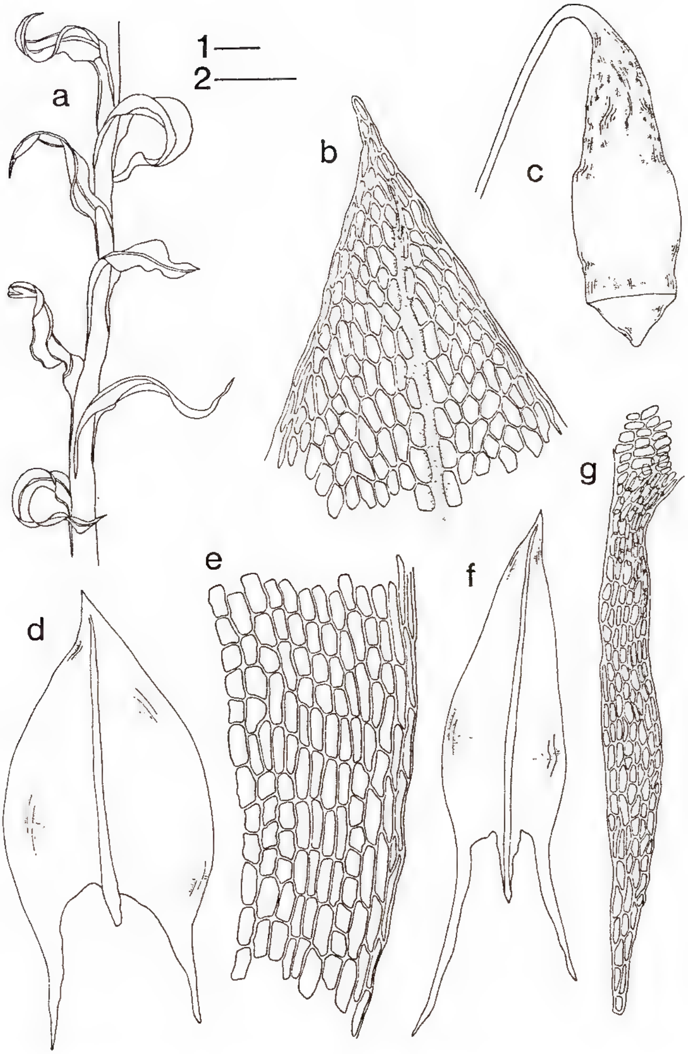

Figure 11. *Bryum weigelii*. a. Habit. b. Leaf apex. c. Capsule and operculum. d & f. Leaves. e. Basal leaf cells and margin. g. Leaf decurrency. Scales in mm: Bar 1 = 0.5 (c); Bar 2 = 0.5 (d,f); Bar 2 = 0.1 (b,e); Bar 2 = 0.2 (g); Bar 2 = 1.0 (a).Species unknown or excluded from Maine.

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Additions to the lichen flora of North America V. *Arthonia stellaris*

Tor Tønsberg[1]

Abstract. Arthonia stellaris *is reported new to North America from Washington, USA, where it is corticolous on* Alnus rubra *in extremely oceanic localities.*

In Washington state, the coastal lowlands between the mountains of the Olympic Peninsula National Park and the Pacific ocean are particularly rich in oceanic lichens. During several field trips to this area in the fall of 1994, the lichen *Arthonia stellaris* was collected in three different, extremely oceanic localities. The species is believed to be new to North America as it is not listed by Egan (1987), in the recent additions to his checklist (Egan 1989, 1990, 1991) or as far as I know, in any other paper dealing with North American lichens.

Arthonia stellaris Kremp.

Within the genus *Arthonia* this species is characterized by the linear to stellate, reddish brown lirellae, brown and warted, 3- or 4-septate ascospores with an enlarged upper cell, and the chemical constituent "stellaris unknown" (see Coppins 1989). During the present study, one specimen from North America was compared chemically (TLC) with one from Norway. Both contained an additional, minor compound at R_f-classes A 3(-4), B 3(-4), C 2-3.

The North American specimens formed irregular patches, 5 - 20 mm in diameter, among other crustose lichens on the smooth bark of *Alnus rubra* in communities rich in oceanic lichens, e.g. *Arthonia ilicina* Taylor, *Lecanora farinaria* Borrer, *Gyalideopsis anastomosans* P. James & Vězda, *G. piceicola* (Nyl.) Vězda & Poelt (syn. *G. alnicola* W. Noble & Vězda), *Micarea clavopycnidiata* Brodo & Tønsberg, an undescribed species of *Megalaria* (Ekman & Tønsberg ined.), and *Schaereria corticola* Muhr & Tønsberg. In North America *Arthonia stellaris* has so far been found only in the coastal lowlands of westernmost Washington at altitudes of 10 - 30 m. Outside North America, it is known from high rainfall

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areas of western and central, temperate Europe (Coppins 1989, 1992). With the new finds from Washington, *A. stellaris* shows a western Europe to western North America disjunct distribution.

Specimens seen (BG): **USA. Washington.** [The Olympic Peninsula,] Clallam Co., between Forks and the Pacific shore (three different localities), 1994, *Tønsberg 21285, 21517, 21553.*

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1995 ASC Annual Meeting at UC Berkeley June 30 - July 3

The 1995 ASC Annual Meeting will be hosted jointly by UC Berkeley and the California Academy of Sciences on June 30 - July 3. The meeting will feature a workshop on "Natural History Collections on the Information Superhighway." Partnerships among systematics collections of various kinds, and state and federal agencies will be the topic of another session. Finally, ASC members and friends will discuss ASC's strategic planning initiative, in light of these partnerships.

For Registration and hotel information, contact: ASC, 730 11th Street, NW, Second Floor, Washington, D.C. 20001-4521; (202) 347-2850; fax: (202) 347-0072.

Mosses from the state of Missouri -- New county records

Carl Darigo[1]

The Webster Groves Nature Study Society is a 75-year old St. Louis area organization, with members interested in a wide variety of nature subjects, such as birding, botany, entomology and general environmental concerns. The Botany Group, led by Father James Sullivan, takes weekly field trips during all seasons of the year, mainly specializing in herbaceous plants. Since winter outings necessarily concentrate on tree buds and dried plants, in late 1994, Father Sullivan issued a challenge to the group to observe mosses, which would remain green and visible during the upcoming cold weather season.

The resultant studies (WGNSS field trips, plus several private trips) have to date turned up 62 new records for mosses in six Missouri counties. The northern edge of the Interior Highlands of North America generally follows the Missouri River in the state of Missouri. The northern portion of the Interior Highlands consists of the Salem Plateau, associated with oak-hickory forests. St. Louis, Ste. Genevieve and Washington Counties are located on the northeastern edge of the Salem Plateau, while border counties Lincoln, St. Charles and Warren, are just north of the Missouri River, immediately adjacent to the Interior Highlands.

All specimens were verified by B. Allen and are deposited at MO. Distribution comments and county record data were taken from Redfearn (1983, 1994).

AMBLYSTEGIACEAE

Amblystegium serpens (Hedw.) Schimp. in B.S.G. - St. Charles: near Pitman Hill Rd. crossing of Katy Trail, **Darigo 1867**. Common throughout Interior Highlands.

A. varium (Hedw.) Lindb. - Lincoln: David Kessler Wildlife Area, parking lot, **Darigo & Darigo 2070**; St. Charles: near Pitman Hill Rd. crossing of Katy Trail, **Darigo 1865**; Warren: Reifsnider State Forest, White Oak Trail, **Darigo & Darigo 2011** p.p., mixed with Campylium hispidulum (Brid.) Mitt. Common throughout Interior Highlands.

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Campylium chrysophyllum (Brid.) J. Lange. - Warren: Reifsnider State Forest, White Oak Trail, **Darigo & Darigo 2012**. Very common throughout Interior Highlands.

C. hispidulum (Brid.) Mitt. - Lincoln: William Logan Wildlife Area, Lake #6 Trail, **Darigo & Darigo 2030**; Warren: Reifsnider State Forest, White Oak Trail, **Darigo & Darigo 2011 p.p**. Very common throughout Interior Highlands.

Hygroamblystegium noterophilum (Sull. & Lesq. in Sull.) Warnst. - Washington: Meramec State Park, Hamilton Spring branch, **Darigo 1928**. Uncommon in Salem Plateau, previously recorded in only six Missouri Salem Plateau counties.

H. tenax (Hedw.) Jenn. var. tenax. - St. Charles: Weldon Spring Conservation Area, near Katy Trail, **Darigo & Sullivan 1812**; St. Louis: Queeny Park, Owl Creek Trail, **Darigo 1817**; Warren: Reifsnider State Forest, North Fork of Charette Creek, **Darigo 2058**; Washington: Meramec State Park, Hamilton Creek, **Darigo 1936**. Very common throughout Interior Highlands.

Leptodictyum riparium (Hedw.) Warnst. - Warren: Reifsnider State Forest, North Fork of Charette Creek, **Darigo 2054**. Common throughout Interior Highlands.

ANOMODONTACEAE

Anomodon attenuatus (Hedw.) Hueb. - Warren: Reifsnider State Forest, Lizard Rock Trail, **Darigo 2053**. Very common throughout Interior Highlands.

A. minor (Hedw.) Fuernr. - St. Charles: Weldon Spring Conservation Area, near Katy Trail, **Darigo 1802**; Warren: Reifsnider State Forest, Lizard Rock Trail, **Darigo 2052**. Very common throughout Interior Highlands.

A. rostratus (Hedw.) Schimp. - Warren: near Katy Trail, Dutzow access, **Darigo & Darigo 1825**. Very common throughout Interior Highlands.

Haplohymenium triste (Ces. in De Not.) Kindb. - St. Charles: near Pitman Hill Rd. crossing of Katy Trail, **Darigo 1869**. Very common throughout Interior Highlands.

BRACHYTHECIACEAE

Brachythecium acuminatum (Hedw.) Aust. var. *acuminatum* - Lincoln: William Logan Wildlife Area, Mill Creek, **Darigo & Darigo 2027**. Common throughout Interior Highlands.

B. acuminatum (Hedw.) Aust. var. *cyrtophyllum* (Kindb.) Redf. ex Crum. - Lincoln: Winfield cemetery, **Darigo & Darigo 1901**; St. Louis: Babler State Park, Guy Park Drive, **Darigo & Vanderbilt 1988**. Common throughout Interior Highlands.

B. oxycladon (Brid.) Jaeg. - Lincoln: Winfield, MO cemetery, **Darigo & Darigo 1904**; St. Charles: Weldon Spring Conservation Area, near Highway 94, **Darigo 1949**. Very common throughout Interior Highlands.

B. rivulare Schimp in B.S.G. - Washington: Meramec State Park, Hamilton Spring discharge, **Darigo 1932**. Common throughout Interior Highlands and abundant in spring branches.

B. rutabulum (Hedw.) Schimp. in B.S.G. - Warren: Reifsnider State Forest, North Fork of Charette Creek, **Darigo 2057**. Uncommon throughout Interior Highlands, not found previously in border counties.

Bryhnia graminicolor (Brid.) Grout. - St. Charles: St. Peters, **Darigo & Vanderbilt 2061**; Washington: Meramec State Park, near Hamilton Cave, **Darigo 1941**. Common throughout Interior Highlands.

Bryoandersonia illecebra (Hedw.) Robins. - Washington: Meramec State Park, Hamilton Creek Trail, **Darigo 1945**. Very common throughout Interior Highlands.

Eurhynchium hians (Hedw.) Sande-Lac. - St. Charles: Katy Trail State Park, near Pitman Hill Rd. crossing, **Darigo & Sullivan 1866**; Washington: Meramec State Park, near Hamilton Spring, **Darigo 1930**. Common throughout interior highlands.

Steerecleus serrulatum (Hedw.) Robins. - St. Charles: St. Peters, **Darigo & Vanderbilt 2063**. Very common throughout Interior Highlands.

BRYACEAE

Bryum pseudotriquetrum (Hedw.) Gaertn. et al. - Warren: Reifsnider State Forest, North Fork of Charette Creek, **Darigo 2055**. Very common throughout Interior Highlands.

Pohlia nutans (Hedw.) Lindb. - St. Charles: Bangert Wildlife Area, below I-70 bridge, **Darigo 1853**. Very common throughout Interior Highlands.

P. wahlenbergii (Web. & Mohr.) Andrews. - St. Charles: Weldon Spring Conservation Area, Lost Valley Trail, **Darigo & Darigo 1798**; Warren: Reifsnider State Forest, North Fork of Charette Creek, **Darigo 2059**. Common throughout Interior Highlands, but found previously in only one border county.

ENTODONTACEAE

Entodon seductrix (Hedw.) C. Muell. - St. Charles: St. Peters, **Darigo & Vanderbilt 2064**. Very common throughout Interior Highlands.

FISSIDENTACEAE

Fissidens bushii (Card. & Ther.) Card. & Ther. - St. Louis: Powder Valley Nature Center, Broken Ridge Trail, **Darigo 1735**; Ste. Genevieve: Pickle Springs Natural Area, parking lot, **Darigo & Sullivan 1906**; Warren: Reifsnider State Forest, White Oak Trail, **Darigo & Darigo 2008**. Uncommon in Salem Plateau and not previously reported in border counties.

F. taxifolius Hedw. - St. Charles: St. Peters, **Darigo & Vanderbilt 2062**. Very common throughout Interior Highlands.

FUNARIACEAE

Aphanorrhegma serratum (Hook. f. & Wils. in Drumm.) Sull. in Gray. - St. Charles: Weldon Spring Conservation Area, near Femme Osage Slough, **Darigo, Sullivan & Ruschill 1951**; St. Louis: Jefferson Barracks Park, bank of Mississippi River, **Darigo 1834**. Uncommon in Salem Plateau, previously recorded in only seven Missouri Salem Plateau and border counties.

Physcomitrium pyriforme (Brid.) Hampe. - St. Charles: Weldon Spring Conservation Area, near Missouri River, **Darigo & Sullivan 2041**. Very common throughout Interior Highlands.

HYPNACEAE

Platygyrium repens (Brid.) Schimp. in B.S.G. - Lincoln: David Kessler Wildlife Area, forest road, **Darigo & Darigo 2069**; St. Charles: Weldon Spring Conservation Area, Lost Valley Trail, **Darigo & Darigo 1850**. Very common throughout Interior Higlands.

Taxiphyllum taxirameum (Mitt.) Fleisch. - St. Charles: Weldon Spring Conservation Area, near Highway 94, **Darigo 1947**; Washington: Washington State Park, 1,000 Steps Trail, **Darigo & Ruschill 2015**. Very common throughout Interior Highlands.

LESKEACEAE

Haplocladium microphyllum (Hedw.) Broth. - St. Charles: Weldon Spring Conservation Area, near Katy Trail, **Darigo 2042**. Uncommon throughout Interior Highlands.

Leskea gracilescens Hedw. - Lincoln: William Logan Wildlife Area, Mill Creek, **Darigo & Darigo 2026**; St. Charles: Weldon Spring Conservation Area, Lost Valley Trail, **Darigo & Darigo 1846**; Warren: Reifsnider State Forest, White Oak Trail, **Darigo & Darigo 2010**. Very common throughout Interior Highlands.

LEUCOBRYACEAE

Leucobryum glaucum (Hedw.) Aongst. in Fries. - Lincoln: William Logan Wildlife Area, Lake #6 Trail, **Darigo & Darigo 2029**. Very common throughout Interior Highlands.

MNIACEAE

Plagiomnium ciliare (C. Mull.) T. Kop. - St. Louis: Queeny Park, Fox Run Trail, **Darigo, Sullivan & Vanderbilt 1897**. Very common throughout Interior Highlands.

P. rostratum (Shrad.) T. Kop. - Washington: Meramec State Park, outside Hamilton Cave entrance, **Darigo 1943**. Uncommon in Interior Highlands, reported only once from Missouri.

ORTHOTRICHACEAE

Orthotrichum strangulatum P. Beauv. - Warren: Reifsnider State Forest, campsite, **Darigo 2060**. Common in Salem Plateau.

POLYTRICHACEAE

Atrichum angustatum (Brid.) Bruch & Schimp. in B.S.G. - St. Charles: Weldon Springs Conservation Area, near Highway 94, **Darigo 1948**. Very common throughout Interior Highlands.

POTTIACEAE

Barbula unguiculata Hedw. - St. Charles: Weldon Spring Conservation Area, Lost Valley Trail, **Darigo & Darigo 1848**; Warren: Reifsnider State Forest, White Oak Trail, **Darigo & Darigo 2007**. Common throughout Interior Highlands.

Phascum cuspidatum Hedw. - St. Louis: Jefferson Barracks Park, bank of Mississippi River, **Darigo 1835**. Uncommon in Salem Plateau, previously recorded in only four Missouri Salem Plateau and border counties.

THELIACEAE

Thelia asprella Sull. in Sull. & Lesq. - Lincoln: William Logan Wildlife Area, Lake #6 Trail, **Darigo & Darigo 2028**; Warren: Reifsnider State Forest, White Oak Trail, **Darigo & Darigo 2009**. Very common throughout Interior Highlands.

THUIDIACEAE

Cyrto-hypnum pygmaeum (Schimp. in B.S.G.) Buck & Crum. - Washington: Washington State Park, 1,000 Steps Trail, **Darigo & Haller 2014**. Common throughout Interior Highlands.

Acknowledgments. The author wishes to thank Father James Sullivan and other Webster Groves Nature Study Society members for spurring interest in mosses and also Bruce Allen of the Missouri Botanical Garden for graciously sharing his expertise.

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State and County Moss Records for Arkansas II

Piers Majestyk[1]

Abstract. *New distributional records of mosses are given for 11 counties in Arkansas.* Archidium tenerrimum *W. Mitten,* Bruchia drummondii *G. E. L. Hampe* ex *E. G. Britton,* Ephemerum spinulosum *P. Bruch & W. P. Schimper in W. P. Schimper,* Grimmia olneyi *W. S. Sullivant,* Sphagnum cyclophyllum *W. S. Sullivant & L. Lesquereux, and* S. trinitense *C. J. A. Müller are reported new to the state.*

A total of 65 county records, six of which are state records, have been identified from 11 Arkansas counties. These new records are from collections kept at Henderson State University, Arkadelphia, Arkansas, and from material recently collected by the author.

Voucher specimens of all species collected are deposited in the herbarium of Henderson State University. Nomenclature for the most part follows that of Anderson (1990) and Anderson et al. (1990). New state records are identifed with an asterisk (*). Collecter, collection number, and location are given for all records except those of the author, in which the collecter is omitted. County names are in boldface. For additional references concerning distributional records of Arkansas mosses consult Majestyk (1994) and Redfearn (1994).

AMBLYSTEGIACEAE

Amblystegium varium (J. Hedwig) S. O. Lindberg -- **Calhoun**: 1309; Hot Spring: 1210.

Campylium chrysophyllum (S. E. Bridel) J. M. C. Lange -- **Calhoun**: 1313.

ANOMODONTACEAE

Anomodon attenuatus (J. Hedwig) J. W. P. Hübener -- **Calhoun**: 1317.

A. rostratus (J. Hedwig) W. P. Schimper -- **Clark**: Walls 74.

ARCHIDIACEAE

Archidium tenerrimum* W. Mitten -- **Calhoun: 1310.

---

[1] Biology Department, University of Southwestern Louisiana, Lafayette, LA 70504-2451

BRACHYTHECIACEAE

Bryoandersonia illecebra (J. Hedwig) H. Robinson -- **Calhoun**: 1319.

Eurhynchium hians (J. Hedwig) C. M. Sande Lacoste -- **Lee**: Marsh 5737.

Steerecleus serrulatus (J. Hedwig) H. Robinsin -- **Calhoun**: 1323; Chicot: Kuyper 374; **Polk**: Marsh 2139.

BRUCHIACEAE

Bruchia drummondii* G. E. L. Hampe *ex* E. G. Britton -- **Union: 1292.

B. flexuosa (O. Swartz *ex* C. F. Schwaegrichen) C. J. A. Müller -- **Calhoun**: 1300; **Union**: 1291.

BRYACEAE

Bryum argenteum J. Hedwig -- **Hot Spring**: 1205.

B. pseudotriquetrum (J. Hedwig) P. G. Gaertner, B. Meyer & J. Scherbius -- **Pike**: McKinnon 176.

BUXBAUMIACEAE

Diphyscium foliosum (J. Hedwig) D. M. H. Mohr -- **Clark**: Brozowski 56.

CLIMACIACEAE

Climacium americanum S. E. Bridel -- **Dallas**: 1215.

CRYPHAEACEAE

Cryphaea glomerata P. Bruch, W. P. Schimper & T. Gümbel *ex* W. S. Sullivant -- **Calhoun**: 1318.

DICRANACEAE

Dicranella heteromalla (J. Hedwig) W. P. Schimper -- **Clark**: McKinnon 144; **Hot Spring**: 1330.

DITRICHACEAE

Ditrichum pallidum (J. Hedwig) G. E. L. Hampe -- **Calhoun**: 1298.

Pleuridium subulatum (J. Hedwig) G. L. Rabenhorst -- **Calhoun**: 1299.

ENTODONTACEAE

Entodon seductrix (J. Hedwig) C. J. A. Müller -- **Calhoun**: 1311; **Pike**: Marsh 7505; **Union**: 1293.

EPHEMERACEAE

Ephemerum spinulosum* P. Bruch & W. P. Schimper *in* W. P. Schimper -- **Clark: Marsh 7915; **Pike**: McKinnon 175.

FABRONIACEAE

Clasmatodon parvulus (G. E. L. Hampe) W. J. Hooker & W. Wilson -- **Calhoun**: 1322.

FISSIDENTACEAE

Fissidens dubius A. M. F. J. Palisot de Beauvois -- **Calhoun**: 1303.

F. fontanus (A. J. M. Bachelot de Pylaie) E. G. V. Steudel -- **Hot Spring**: McKinnon 191.

FONTINALACEAE

Fontinalis filiformis W. S. Sullivant & L. Lesquereux -- **Clark**: Cowling 262.

Fontinalis novae-angliae W. S. Sullivant -- **Calhoun**: 1324; **Dallas**: 1226.

FUNARIACEAE

Funaria flavicans A. Michaux -- **Calhoun**: 1306; **Clark**: McKinnon 219.

Physcomitrium pyriforme (J. Hedwig) G. E. L. Hampe -- **Clark**: Marsh 2179.

GRIMMIACEAE

Grimmia olneyi* W. S. Sullivant -- **Pope: Marsh 7641.

HYPNACEAE

Hypnum lindbergii W. Mitten -- **Dallas**: 1224.

Platygyrium repens (S. E. Bridel) P. Bruch, W. P. Schimper & T. Gümbel -- **Calhoun**: 1321.

LESKEACEAE

Leskea polycarpa J. Hedwig -- **Dallas**: 1227.

LEUCOBRYACEAE

Leucobryum albidum (S. E. Bridel *ex* A. M. F. J. Palisot de Beauvois) S. O. Lindberg -- **Calhoun**: 1307; **Dallas**: 1223.

LEUCODONTACEAE

Leucodon julaceus (J. Hedwig) W. S. Sullivant -- **Calhoun**: 1304; **Dallas**: 1216;

Union: 1289.

MNIACEAE

Plagiomnium ciliare (C. J. A. Müller) T. Koponen -- **Bradley**: Brozowski 71; **Dallas**: 1222.

P. cuspidatum (J. Hedwig) T. Koponen -- **Clark**: Marsh 2189; **Pike**: McKinnon 177; **Union**: 1294.

POLYTRICHACEAE

Atrichum angustatum (S. E. Bridel) P. Bruch, W. P. Schimper & T. Gümbel -- **Calhoun**: 1302.

A. undulatum (J. Hedwig) A. M. F. J. Palisot de Beauvois -- **Clark**: Watson 46.

Polytrichum commune J. Hedwig -- **Calhoun**: 1301.

POTTIACEAE

Tortella humilis (J. Hedwig) O. E. Jennings -- **Calhoun**: 1305.

Weissia controversa J. Hedwig -- **Union**: 1290.

PTYCHOMITRIACEAE

Ptychomitrium drummondii (W. Wilson) W. S. Sullivant -- **Clark**: McKinnon 117.

P. incurvum (C. F. Schwaegrichen) R. Spruce -- **Clark**: Golden 46.

SEMATOPHYLLACEAE

Sematophyllum adnatum (A. Michaux) E. G. Britton -- **Dallas**: 1225; **Union**: 1297.

SPHAGNACEAE

Sphagnum cyclophyllum* W. S. Sullivant & L. Lesquereux -- **Calhoun: Marsh 8077.

S. lescurii W. S. Sullivant -- **Calhoun**: 1328.

S. trinitense* C. J. A. Müller -- **Clark: Wallace 91.

THELIACEAE

Thelia hirtella (J. Hedwig) W. S. Sullivant -- **Calhoun**: 1308; **Dallas**: 1221.

Acknowledgments. I thank Dr. William Reese for assistance in confirming and correcting many of the above identifications. I also thank Dr. Daniel Marsh for loaning me the mosses from the Henderson State University Herbarium.

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Request for Literature

The association of Systematics Collections (ASC) is embarking on a second round of obtaining biosystematic literature for the Biodiversity Information Exchange with Cuba Project. This time, literature acquired will be distributed to institutions outside of Havana. Cuban research institutions, trying to build biodiversity information resources, have a great need for current and back issues of *The Bryologist* and other ecological and biosystematic literature. To donate and for more information, please contact Elizabeth Hathway, ASC, 730 11th Street, NW, Second Floor, Washington, D.C. 20001-4521, phone (202) 347-2850, fax: (202) 347-0072.

Tortula fragilis in the Interior Highlands of North America

Paul L. Redfearn, Jr.[1]

Tortula fragilis was reported from Oklahoma in the Interior Highlands of North America from a collection by Redfearn (1970, 1972). However, in examining cross-sections of the leaves of this collection [*Redfearn 24853* (MO, SMS)] and new collections of this moss from the same locality in Oklahoma [(*Allen 6209* (MO), *Buck 15747* (NY), *Redfearn 34511* (MO, SMS)] , Buck and Allen (1992), found all of them to have bistratose leaves, a condition not found in *T. fragilis*. They assigned these collections with bistratose leaves to *T. chisosa* Magill, Delg. & Stark and excluded *T. fragilis* from the moss flora of the Interior Highlands.

Recently *Tortula fragilis*, with it characteristic torn and broken unistratose leaves and shortly excurrent costae, was collected in northwestern Arkansas. Thus, *T. fragilis* can be reinstated to the moss flora of the Interior Highlands. The locality and habitat for this collection is:

Arkansas: Newton County. Along tributary to Little Buffalo River. On vertical shaded limestone of a north-facing slope in an old growth hardwood forest. NW 1/4 SE 1/4 sec. 14, T. 15 N., R. 22 W. Alt. ca 260-304 m. *Redfearn 38284* (MO, SMS), duplicate examined by R. Magill.

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______. 1972. Mosses of the Interior Highlands of North America. Annals of Missouri Bot. Gard. 59: 1-103. Reprinted with changes and additions, 1983.

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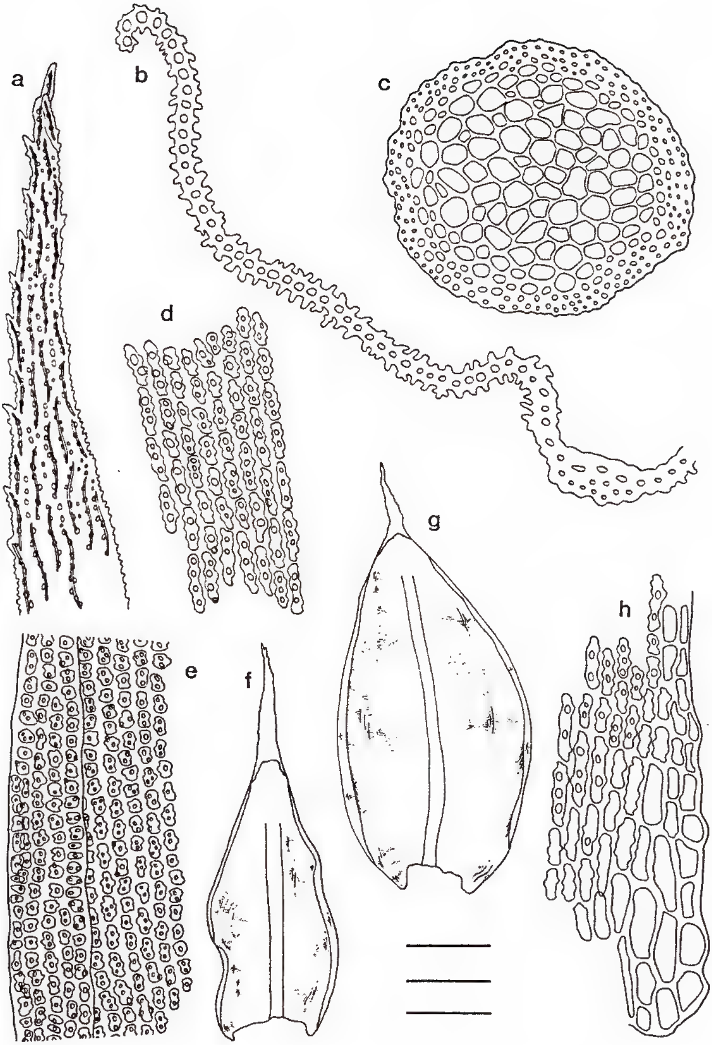

ERRATA. Dr. Arne A. Frisvoll has pointed out an error in my leaf illustrations of *Racomitrium canescens* (Evansia 11: 46. f. 2. 1994). As the description notes, the costa in this species is 1/2 to 2/3 the leaf length - never percurrent as I figured it. This error is corrected in the above plate. - Bruce Allen

Guide to contributors to *EVANSIA*

The aim of *Evansia* is to provide a vehicle for the presentation and exchange of useful information on North American bryophytes and lichens. Articles are frequently popular in nature rather than technical and are intended to teach and inform both amateurs and professionals. The articles include, but are not restricted to, announcements of and reports on forays and meetings, presentations of techniques and aids for studying and curating lichens and bryophytes, and reports on local floras. Checklists and papers documenting new regional, state, or county records must include voucher specimens (collector and collection number) and an indication of where the specimens are deposited or a literature reference.

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Bryological Studies in Kansas: Neosho County

Hermann F. Nonnenmacher[1&2] and Stephen L. Timme[2]

Abstract. *Previous surveys of Kansas bryophytes have either been regional or statewide in scope. This study is the first systematic survey to be conducted at the county level in Kansas. Collections representing 699 specimens from 51 localities were made from the fall, 1991 through spring, 1992. Seventeen species of hepatics, distributed among 9 genera and 7 families, and 60 species of mosses, distributed among 40 genera and 21 families are reported for the county based on field collections and literature reports. The hepatic* Nowellia curvifolia *(Dicks.) Mitt. and the mosses* Rhizomnium punctatum *(Hedw.) T. Kop. and* Fissidens bushii *(Card. & Ther.) Card. & Ther. are first reports for Kansas. Six species of hepatics and 48 species of mosses are reported for the first time in the county.*

Bryophytes have been collected in Kansas since at least the 1870's, but no systematic inventory of them on a county-by-county basis has been conducted. Major contributions to the Kansas bryoflora have been regional (Smith 1966), statewide (McGregor 1955; Churchill 1985), or scattered (Merrill 1989, 1991a, 1991b) in their scope. McGregor (1955) and Churchill (1985) provide an overview of the literature concerning the bryoflora of Kansas. Most collections have concentrated on the eastern third of Kansas, but even this part of the state has several poorly collected counties. The unevenness of collecting throughout Kansas has resulted in a patchwork that has left many counties undercollected. As far as known, no systematic inventory of bryophytes at the county level has been conducted thus far for the state.

In southeastern Kansas, Neosho county is one of the most poorly collected for bryophytes (fig. 1). Prior to this study, 12 species of mosses (Churchill 1985; Merrill 1991b) and 11 hepatics (McGregor 1955) were reported for Neosho County.

The objectives of this paper are to present a brief overview of Neosho County, Kansas and provide a checklist of bryophyte species known to occur there.

---

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Location and Description of Study Area

Neosho County is located in southeast Kansas (fig. 1) and has a total area of nearly 152,056 ha (ca. 227 km^2). The county lies in the Cherokee Prairie land resource area of the Osage Cuestas physiographic region of the central lowlands. Elevation ranges from about 252 m to 328 m above sea level. The county is drained by the Neosho River and its tributaries except for the southwest corner, which is drained by a tributary of the Verdigris River.

The climate of Neosho County is continental, with a recorded temperature range from a high of 47° C to a low of -31° C. The average temperature is 13.5° C. The average annual precipitation is 101 cm, but is unevenly distributed throughout the year (U.S. Dept. of Agriculture 1982). As expected, there are years of unusually low or high precipitation.

Surface geology of the county consists primarily of Paleozoic deposits of the Pennsylvanian System. Soils have a parent material of chert, cherty gravel, cherty limestone, limestone, shale, and sandstone. Shallow soils typically are the sandiest or rockiest, containing many rock outcrops and occurring on the higher elevations with steep slopes. Deeper soils are found on more level to gently sloping areas, while alluvial deposits are restricted to the river drainages.

A study of the potential natural vegetation of Neosho County was made by Carter (1967). The county consists primarily of alternating forest and prairie, with forests occurring mostly near streams and on north-facing slopes (Dice 1943). Three natural vegetation types were described by Carter (1967): 1) Cross Timbers (*Quercus-Andropogon*), 2) oak-hickory Forest, and 3) Bluestem Prairie. Approximately 3.0 percent of the county is wooded, consisting mostly of a mixture of oak-hickory and riparian corridor tree species (e.g. *Platanus occidentalis* L., *Acer negundo* L., *Ulmus americana* L., *Celtis occidentalis* L, *Fraxinus pennsylvanica* Marsh, *Quercus muehlenbergii* Engelm., etc.).

Grasslands account for approximately 35 percent of the total vegetation in the county, with most converted to fescue grass. Cultivation, severe erosion or disturbance, and population centers make up more than 60 percent of the county.

Materials and Methods

Neosho County lies within 15 quadrangles, for which delineations were superimposed onto the county map for easy reference. Within each quadrangle, collection localities were selected for their accessibility and representation of a variety of existing habitats. Criteria deemed important included available surface water, possible outcrops of sandstone and limestone, least disturbed areas with various native vegetation types and soil associations, and disturbed areas undergoing vegetative succession on exposed, homogeneous soils.

Collecting and specimen preparation for accession followed accepted bryological techniques. All collection data were entered into the T. M. Sperry Herbarium data base (HERB). Voucher specimens are deposited in KSP with duplicates sent to MO, UWSP, and IBE. Remaining duplicate material is available. Nomenclature generally follows Schuster (1966, 1969, 1974, 1980, 1992) or Stotler and Crandall-Stotler (1977) for the liverworts and Anderson, Crum and Buck (1990) for the mosses. The below list includes collections by the authors and literature reports.

Results and Discussion

The current study of the bryoflora of Neosho County, Kansas has resulted in the collection of 77 species. The hepatics presently comprise 17 species in nine genera and 7 families, with one new state record and five new county records. Sixty mosses are reported in 40 genera and 21 families, with one new state record and 46 new county records. In comparison to the state, Neosho County has currently yielded about 23 percent (17/70) of the known hepatics and 36 percent (60/162) of the known mosses.

Three species are here first reports for Kansas. *Nowellia curvifolia* (Dicks.) Mitt. (Hepaticae) was collected by the second author off a decaying log in predominantly oak/hickory forest. According to Schuster (1974), this is a widely distributed species ranging in North America from Ontario east, south to Alabama, and west to Missouri, Iowa, and Arkansas. As far as known, the Kansas location represents its most western distribution in North America.

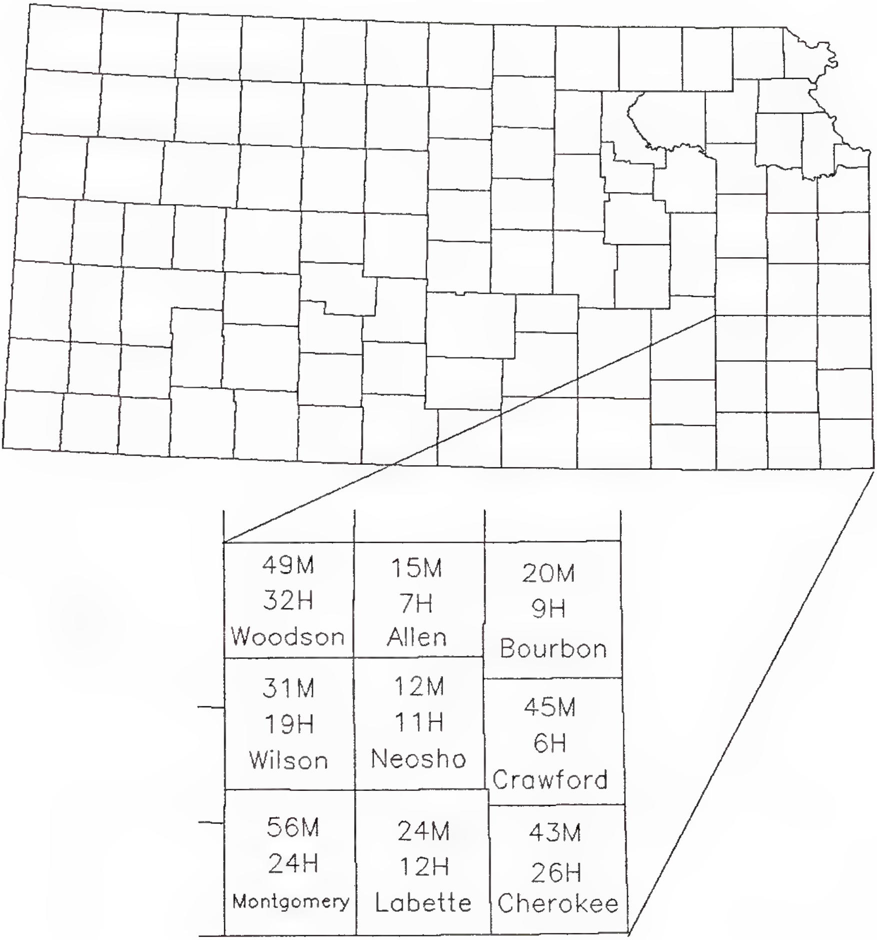

Fig. 1. Number of reported bryophyte taxa for southeast Kansas by county. M = mosses, H = hepatics.

Rhizomnium punctatum (Hedw.) T. Kop. was collected by the first author off soil in riparian woodlands. In North America, it is distributed from eastern Canada south into Alabama and Arkansas (Crum and Anderson, 1981) It is widely distributed in western Missouri, eastern Oklahoma, and northern Arkansas. Although expected to be in Kansas, it is thus far known only from collections made during this study.

Fissidens bushii (Card. & Ther.) Card. & Ther. is previously known from eastern North America west to Michigan, south to Missouri, Oklahoma, and Texas (Crum and Anderson 1981; Redfearn 1992). In Neosho County it was collected by the first author from soil of creek banks and native prairie.

Two species have interesting distributions in Kansas. *Orthotrichum diaphanum* Brid. is known from the central part of the state and as far west as Ness County. Although reported from a few counties in southwest Missouri and northwest Arkansas (Redfearn 1992), it has not been reported from the first four vertical tiers of counties in Kansas. The closest Kansas location from Neosho County is HarveyCounty, some 290 km to the west. It was collected from the bark of *Ulmus sp.* in a dry wooded area of a steep hillside with heavy undergrowth and exposed sandstone.

Fontinalis missourica Card. was previously reported in Kansas from Franklin County by Grace Meeker in 1900 (Churchill 1985). Welch (1960) gave the range for the species to be midwestern, reaching as far south as Arkansas. Redfearn (1992) indicates collections from two southeastern counties in Oklahoma. This species was attached to submerged tree roots in a small creek.

All of the localities studied showed evidence of human impact, in some cases quite recently after the initial collecting. Some of the study areas in which collections were made no longer exist. For example, *Orthotrichum diaphanum* Brid. was collected at Neosho State Lake from the bark of *Ulmus sp.*, which was marked for removal due to disease. *Thelia lescurii* Sull. was collected from the base of an unidentified tree; the area was burned and the woodland nearly scraped clean of trees within a week after the specimen was collected. Although these two species are not endangered, the scenario does reflect the recurring theme of habitat destruction with little or no regard to the organisms that may also be eliminated.

Bryophytes usually are given little or no attention by those modifying natural habitat, and are often not taken into consideration by those concerned with preservation and/or conservation. Should this lack of consideration and habitat degradation continue, the future of even some common bryophytes may be in jeopardy. Many bryophyte communities could disappear overnight due to one day's clearing or plowing, or some other form of habitat disturbance. It is unknown how many members of a local bryophyte flora may have been lost before they were ever documented. For example, in Kansas how easy would it be to lose *Aschisma kansanum* Ander. or the recently discovered *Ozobryum ogalalense* Merrill, both endemic to the state, to agriculture or development? One might make the analogy that the bryophytes of some regions of North America are the "tropical rainforests" of the temperate zone. The ecological role of bryophyte communities, whether dominant or not, has been little studied and is, consequently, poorly understood relative to vascular plant communities. Much more data are needed to appreciate the dynamic interactions between bryophytes and their associated organisms, as well as the effect bryophytes have on ambient abiotic factors. Even in regions where bryophytes appear to have a limited role, their presence should not be discounted. Most floristic studies exclude the bryophytes as part of the plant community, apparently considering them insignificant as compared to vascular plants. If we cannot take seriously the advantages of sustaining earth's ecosystems, which includes recognizable organisms such as the spotted owl or the Florida panther, how can anyone consider a bryophyte to be important. The answer, as echoed by others, is that we must preserve, study, and understand the role of bryophytes in an ecosystem or a local habitat, and their value to other organisms, including humans.

The results of this study point to the need for further bryofloristic surveys in the state at the county level. The numerous common species being reported as new county records indicate how sparse is our knowledge of the distribution of the bryophytes of Kansas. Many species are still not well documented; their distributions statewide are incompletely known and their current status remains in question. Until more floristic studies are completed, the bryophytes of Kansas will continue to undergo further environmental impact without proper ecological research or conservation efforts.

Below is a systematic arrangement of the bryophytes occurring in Neosho County. One asterisk indicates a new county record and two asterisks indicate a new state record. Second or third reports for Kansas are indicated in parenthesis. Collection numbers follow and are those of the first author unless otherwise indicated parenthetically.

HEPATOPHYTA

Cephaloziaceae
***Nowellia curvifolia* (Dicks.) Mitt. (Timme 10269a)

Geocalycaceae
Chiloscyphus profundus (Nees) Eng. & Schust. 92-207

Scapaniaceae
**Scapania nemorosa* (L.) Dum. 91-236

Jubulaceae
**Frullania brittoniae* Raddi (third report for state) 91-262
F. eboracensis Gott. 91-498
**F. ericoides* (Nees) Nees 91-499
**F. inflata* Gott. 91-199

Sphaerocarpaceae
Sphaerocarpos texanus Aust. (McGregor, 1955: M1259)

Aytoniaceae
Reboulia hemisphaerica (L.) Raddi 91-234
Mannia fragrans P. Beauv. (McGregor, 1955: M1257)
Asterella tenella (L.) P. Beauv. (McGregor, 1955: M1066)

Ricciaceae
Riccia lamellosa Raddi (McGregor, 1955: M1140)
**R. beyrichiana* Hampe ex Lehm. 92-108
R. campbelliana M. A. Howe (McGregor, 1955: M1260)
R. dictyospora M. A. Howe (McGregor, 1955: M1262)
R. hirta (Aust.) Underw. (McGregor, 1955: M2684)
R. sorocarpa Bisch. (R. H. Thompson s.n. in McGregor, 1955)

BRYOPHYTA

Ditrichaceae
**Ditrichum pallidum* (Hedw.) Hampe 91-220

Leucobryaceae
**Leucobryum glaucum* (Hedw.) Angstr. *in* Fries 91-227

Fissidentaceae
**Fissidens bryoides* Hedw. 91-191
***F. bushii* (Card. & Ther.) Card. & Ther. 91-125
**F. fontanus* (B. Pyl.) Steud. 91-176
**F. obtusifolius* Wils. 91-174
**F. taxifolius* Hedw. 91-526

Pottiaceae
**Astomum muehlenbergianum* (Sw.) Grout 91-326
**Weissia controversa* Hedw. 91-108
**Tortella humilis* (Hedw.) Jenn. 91-124
**Barbula indica* (Hook.) Spreng. *in* Steud. 91-107
**B. unguiculata* Hedw. 92-099
**Phascum cuspidatum* Hedw. 92-085
Desmatodon obtusifolius (Schwaegr.) Schimp. 91-387
**D. plinthobius* Sull. & Lesq. *in* Sull. 91-136
**D. porteri* James *in* Aust. 91-269
**Tortula pagorum* (Milde) De Not 92-072

Grimmiaceae
**Schistidium agassizii* Sull. & Lesq. *in* Sull. 91-116

Funariaceae
Physcomitrium pyriforme (Hedw.) Hampe 91-164
Funaria flavicans Michx. (Holland 5227 in Merrill, 1991b)
**F. hygrometrica* Hedw. 92-208

Bryaceae
Bryum argenteum Hedw. 91-178
**B. caespiticium* Hedw. 91-112

**B. pseudotriquetrium* (Hedw.) Gaertn. et al. 91-217

Mniaceae
***Rhizomnium punctatum* (Hedw.) T. Kop. 91-426
**Plagiomnium cuspidatum* (Hedw.) T. Kop. 91-142

Aulacomniaceae
**Aulacomnium heterostichum* (Hedw.) Bruch & Schimp. *in* B. S. G. 91-351

Orthotrichaceae
**Orthotrichum diaphanum* Brid. 92-203
**O. pumilum* Sw. 91-381
**O. pusillum* Mitt. 91-173

Fontinalaceae
**Fontinalis missourica* Card. (second report for Kansas) 91-453

Anomodontaceae
**Anomodon minor* (Hedw.) Furnr. 91-120
**A. rostratus* (Hedw.) Schimp. 91-319

Leucodontaceae
**Leucodon julaceus* (Hedw.) Sull. 91-224

Theliaceae
Thelia asperella Sull. *in* Sull. & Lesq. 92-176
**T. lescurii* Sull. *in* Sull. & Lesq. (Holland 6155d in Merrill, 1991)

Fabroniaceae
**Fabronia ciliaris* (Brid.) Brid. 92-074

Leskeaceae
Leskea gracilescens Hedw. 91-115
**Bryohaplocladium microphyllum* (Hedw.) Wat. & Iwats. 91-113
Lindbergia brachyptera (Mitt.) Kindb.92-264

Amblystegiaceae
Campylium chrysophyllum (Brid.) J. Lange 91-213
**C. hispidulum* (Brid.) Mitt. 91-109

**Hygroamblystegium tenax* (Hedw.) Jenn. var. *tenax* 91-185
H. tenax var. *spinifolium* (Schimp.) Jenn. 91-158
**Amblystegium serpens* var. *juratzkanum* (Schimp.) Rau & Herv. 91-156
**A. varium* (Hedw.) Lindb. 91-126
**Leptodictyum humile* (P. Beauv.) Ochyra 91-169
**L. riparium* (Hedw.) Warnst.91-151

Brachytheciaceae
**B. oxycladon* (Brid.) Jaeg. 91-123
**Steerecleus serrulatus* (Hedw.) Robins. 91-129
**Eurhynchium hians* (Hedw.) Sande Lac. 91-159

Entodontaceae
Entodon cladorrhizans (Hedw.) C. Mull. (Holland 6155b in Merrill, 1991)
**E. compressus* (Hedw.) C. Mull. 91-366
**E. seductrix* (Hedw.) C. Mull. 91-114

Hypnaceae
Pylaisiella selwynii Crum et al. 91-210
**Homomallium adnatum* (Hedw.) Broth. 91-237
**Taxiphyllum taxirameum* (Mitt.) Fleisch. 91-276

Polytrichaceae
Atrichum angustatum (Brid.) Bruch & Schimp *in* B.S.G. 91-223
Pogonatum brachyphyllum (Michx.) P. Beauv. (Churchill, 1985)
**Polytrichum juniperinum* Hedw. 91-232

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New and interesting lichenicolous fungi and lichens from Alaska

Mikhail Zhurbenko[1], Rolf Santesson[2], Donald A. Walker[3],
Nancy A. Auerbach[3], and Brad Lewis[3]

Abstract. *A list of 13 species of lichenicolous fungi and four new or rarely reported lichen species from Alaska is presented. The following lichenicolous fungi* - Arthonia *cf.* nephromiaria, A. peltigerina, Cercidospora decolorella, Geltingia associata, Lichenodiplis lichenicola, *and* Zwackhiomyces berengerianus; *as well as the lichen* Lecanora leptacinella *are new to North America.*

Introduction

In the course of identification of lichen specimens collected during ecological studies in Alaska, a number of lichenicolous fungi as well as some interesting lichens have been detected. These specimens are housed at the herbaria of the Komarov Botanical Institute in St.Petersburg, Russia; the Botanical Museum, Uppsala University, Sweden; and the University of Helsinki, Finland.

Study site description

All of the study sites where specimens were collected are located in the state of Alaska (Figure 1). Three of the study sites, Barrow, Barter Island, and Happy Valley, are located on the Arctic Slope, in northern Alaska. Barrow and Barter Island lie within the Arctic Coastal Plain Physiographic Province, Happy Valley lies within the Arctic Foothills Province, and Fort Richardson lies within the Pacific Border Ranges Province (Wahrhaftig, 1965).

The Barrow area is a former U.S. International Biological Program (IBP) study site, and is described thoroughly in Brown et al., 1980. Situated on the coast at the northern extremity of Alaska (71°20′N, 156°30′W; 5 m a.s.l.), Barrow is bounded by the Chuckchi Sea on the west and the Beaufort Sea on the east. The coastal tundra is characterized by low relief, patterned ground, ice wedge polygons, shallow oriented lakes, drained lake basins, and small ponds.

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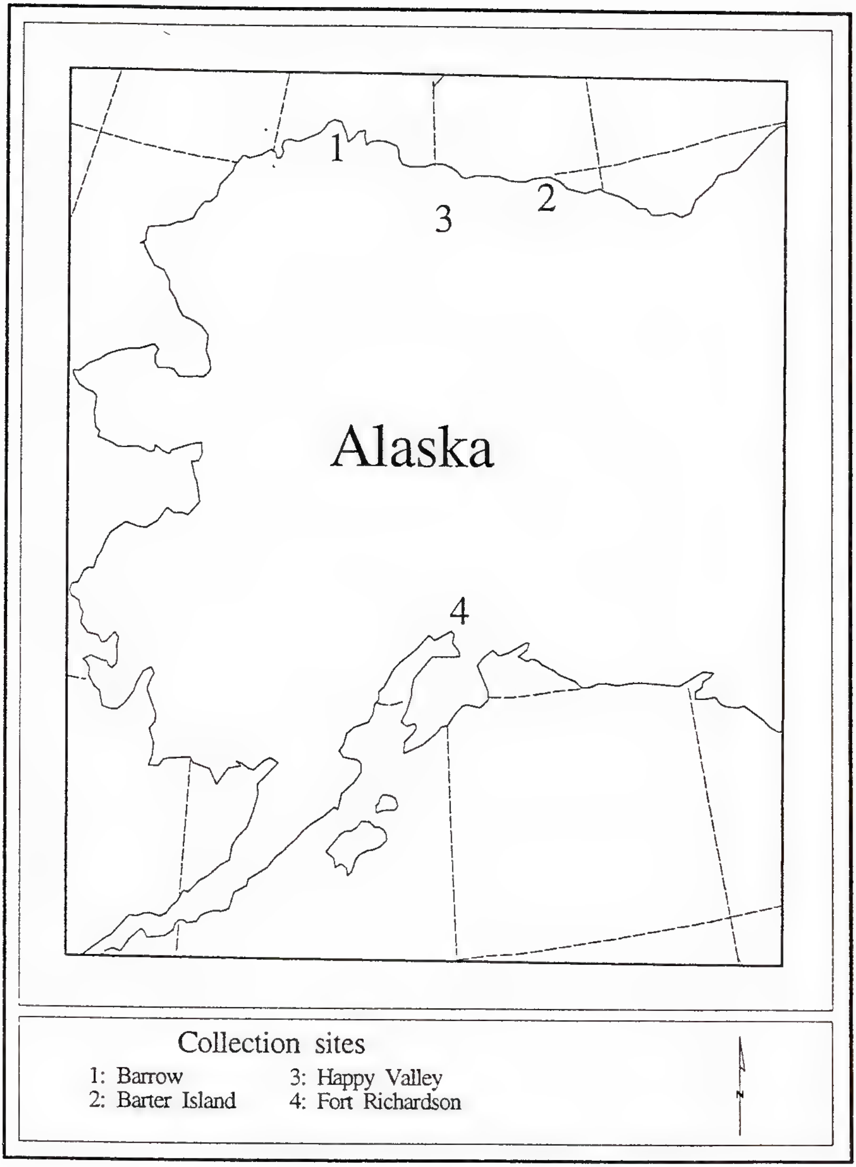

Figure 1. Localities of study sites in the state of Alaska where lichenicolous fungi and lichens were collected.

Another feature present at the Barrow site is a gravelly paleo-beach ridge, formed by a retreating sea during mid-Wisconsianan time. The Barrow peninsula is dominated by wet, acidic (pH < 5.0) soils and sedge meadows, but variations in soil and vegetation across microtopographic features are typical. Lichenicolous fungi collected at Barrow tended to occur in dry to moist vegetation types, on well-drained sites either on centers of high-centered polygons, or on the paleo beach ridge.

Barter Island is located on the coast of the Beaufort Sea (70°8'N, 143°38'W; 12 m a.s.l.) and is situated at the northern edge of the Arctic National Wildlife Refuge (ANWR), an area mapped on a broad scale by Walker et al. (1982). Barter Island and Barrow have similar geomorphic features, but vegetation and soils are more typical of nonacidic (pH > 5.0) tundra as is found at Prudhoe Bay, Alaska. The Prudhoe Bay area, a coastal tundra site lying west of Barter Island, has been described by Walker (1981) and Walker and Everett (1991). Lichenicolous fungi collected at Barter Island tended again to occur in dry to moist vegetation types, on well-drained sites.

The inland Happy Valley site (69°9'N, 147°51'W; 312 m a.s.l.) is characterized by rolling foothills with acidic tussock tundra vegetation similar to that described at Imnavait Creek and Toolik Lake (Walker et al., 1994). The Happy Valley site is situated further north, but is warmer in climate than Imnavait Creek and Toolik Lake. Lichenicolous fungi at Happy Valley was found on a hill crest.

The Fort Richardson study site is located at the western end of the Chugach Mountains in south-central Alaska (61°15'N, 149°37'W; 762-1067 m a.s.l.). Habitats at Fort Richardson are representative of types found in the mountains of south-central Alaska (e.g. Marvin, 1986). Lichenicolous fungi at Fort Richardson were found in a subalpine meadow community, a snowbed community, and in rock crevice alpine communities.

List of Species

Comments: Collection site, date, collector(s), substrate, ecology (for lichens only), and herbaria where specimens are deposited. Herbaria abbreviations: Komarov Botanical Institute in St. Petersburg, Russia (LE)i; Botanical Museum, Uppsala University, Sweden (UPS); University of Helsinki, Finland (H). Substrate abbreviations: apothecia (ap.), thallus (th.). Specimen significance: # - new to North America, $ - new to Alaska, * - lichenicolous fungus.

* *Arthonia* cf. *nephromiaria* (Nyl.) Nyl. ex H. Olivier - Barter Island, 9 VIII 1994, D.A. Walker & N.A. Auerbach, on *Nephroma expallidum* (th.), (LE).

*# *A. peltigerina* (Almq.) H. Olivier - Barrow, 2 VIII 1994, D.A. Walker & N.A. Auerbach, on *Peltigera canina* (th.), (LE).

(*)# *Cercidospora decolorella* (Nyl.) O. E. Erikss. & J. Z. Yue - Barrow, 1 VIII 1994, D.A. Walker & N.A. Auerbach, on algal crust, (LE, UPS).

Cetraria inermis (Nyl.) Krog - , Barter Island, 9 VIII 1994, D.A. Walker & N.A. Auerbach, on soil in dry dwarf-shrub fruticose lichen tundra, (LE).

Cladonia thomsonii Ahti - Barrow, 2 VIII 1994, D.A. Walker & N.A. Auerbach, on soil in moist graminoid forb meadow; 3 VIII 1994, D.A. Walker & N.A. Auerbach, on soil in dry barren; rev. T. Ahti, 1995, (H, LE).

*$ *Dactylospora deminuta* (Th. Fr.) Triebel - Barter Island, 9 VIII 1994, on *Pannaria pezizoides* (th.); 10 VIII 1994, on *Ochrolechia* sp. (th.), *Rinodina turfacea* (th.), *Rinodina turfacea* (th. + ap.); 11 VIII 1994, on *Psoroma hypnorum* (ap.). All specimens: coll. D.A. Walker & N.A. Auerbach, (LE).

* *Everniicola flexispora* D. Hawksw. - Fort Richardson, 13 VII 1994, B.E. Lewis & L. Colemeda, on *Nephroma arcticum* (th.), (LE).

*# *Geltingia associata* (Th. Fr.) Alstrup & D. Hawksw. - Barrow, 1 VIII 1994, 2 VIII 1994. All specimens: coll. D.A. Walker & N.A. Auerbach, on *Ochrolechia inaequatula* (th.), (LE).

* *Illosporium carneum* Fr. - Fort Richardson, 11 VII 1994, B.E. Lewis & L. Colemeda, on *Peltigera leucophlebia* (th.), (LE).

# *Lecanora leptacinella* Nyl in Norrl. - Barrow, 1 VIII 1994, D.A. Walker & N.A. Auerbach, on bryophyte in dry moss lichen meadow, (UPS).

* *Lichenoconium lecanorae* (Jaap) D. Hawksw. - Barrow, 3 VIII 1994, D.A. Walker & N.A. Auerbach, on *Psoroma hypnorum* (ap.), (LE).

*# *Lichenodiplis lichenicola* Dyko & D. Hawksw. - Barter Island, 10 VIII 1994, D.A. Walker & N.A. Auerbach, on *Rinodina turfacea* (th. + ap.), (LE).

* *Phaeosporobolus alpinus* R. Sant., Alstrup & D. Hawksw. - Barrow; 2 VIII 1994, 3 VIII 1994; D.A. Walker & N.A. Auerbach. Barter Island; 9 VIII 1994, 10 VIII 1994, 10 VIII 1994; D.A. Walker & N.A. Auerbach. Fort Richardson, 13 VII 1994, B. E. Lewis & L. Colemeda. All specimens: on *Ochrolechia frigida* (th. + ap.). Happy Valley, 24 VII 1994, D.A. Walker, N.A. Auerbach & A. Gallant, on *Pertusaria dactylina* (th.). All specimens: (LE).

Ramalina almquistii Vain. - Barter Island, 9 VIII 1994, on soil in dry prostrate shrub, forb tundra; 9 VIII 1994, 10 VIII 1994, on soil in dry dwarf-shrub, fruticose lichen tundra. All specimens: coll. D.A. Walker & N.A. Auerbach, (LE, UPS).

* *Sphaerellothecium araneosum* (Rehm ex Arnold) Zopf - Barrow; 3 VIII 1994, 3 VIII 1994; on *Ochrolechia frigida* (th.); 2 VIII 1994, on *Pertusaria dactylina* (th.). All specimens: coll. D. A. Walker & N. A. Auerbach. Barter Island, 10 VIII 1994; D.A. Walker & N.A. Auerbach, on *Ochrolechia frigida* (th.). Fort Richardson, 13 VII 1994, B.E. Lewis & L. Colemeda, on *Ochrolechia frigida* (th.). All specimens: (LE).

* *Sphinctrina turbinata* (Pers.:Fr.) De Not. - Barter Island, 9 VIII 1994, D.A. Walker & N.A. Auerbach, on *Pertusaria* sp. (th. + ap.), (LE).

*# *Zwackhiomyces berengerianus* (Arnold) Grube & Triebel - Barter Island, 10 VIII 1994, D.A. Walker & N.A. Auerbach, on *Mycobilimbia lobulata* (th.), (LE).

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Mosses of Callaway County, Missouri

Carl Darigo[1]

Callaway County, the seventh largest county in Missouri at 842 square miles, is in the central part of the state, with southern border on the Missouri River. The county, with approximately 60% of the area in farmland, is known as the site of Missouri's only nuclear power plant and historically for Winston Churchill's famous 1946 "Iron Curtain" speech, delivered at Westminster College in the county seat of Fulton.

The northern edge of the Interior Highlands of North America generally follows the Missouri River in the state of Missouri, with the northern portion consisting of the Salem Plateau, associated with oak-hickory forests. Callaway is regarded as a "border county", situated on the northern edge of the Interior Highlands and on the southern edge of the glaciated plains.

Over the past year, Sue Vanderbilt of O'Fallon, Missouri, has been conducting restoration work, such as burning, forest thinning and prairie planting, on a tract of land near Williamsburg in Callaway County, owned by her father, Norbert Koenig of St. Peters, Missouri. The 160 acre property consists of about half in upland oak-hickory forest and half still in active farm cultivation. The restoration work is being done on the forested portions, which in years past had been logged and grazed by livestock. The property has an intermittent stream with tributaries, numerous steep ravines, some limestone outcroppings, several partial-glade rocky openings and elevations ranging from 740 feet to 830 feet. The tract has no springs, but does have three well-intrenched farm ponds plus one wet seep, producing an interesting marshy area. Accompanying map shows more details.

Sue Vanderbilt had several herbaceous plant inventories conducted and knowing the author's interest in mosses, suggested a moss survey. Since northern Missouri has not been as well represented in moss data as southern Missouri, Bruce Allen of Missouri Botanical Garden, thought the survey would be a good idea. The survey and specimen collections were done on numerous visits to the property by Sue Vanderbilt and the author during the period, February - May 1995. A total of 45 moss species were collected, of which 23 are new records for

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Callaway County; 22 families and 34 genera are represented. Among dominant species on the forested ridges were *Dicranium scoparium, Hedwigia ciliata* and *Thelia asprella,* while *Hygroamblystegium tenax* var. *tenax, Plagiomnium cuspidatum, Platygyrium repens* and *Anomodon attenuatus* were abundant in the stream bottomland.

Callaway County

Missouri

All specimens were collected by Darigo & Vanderbilt, verified by Bruce Allen and are deposited at MO. Distribution comments and county record data were taken from Redrearn (1983, 1994). Except as noted, all species are regarded as very common or common throughout the Interior Highlands. County record species are denoted by a preceding asterisk.

AMBLYSTEGIACEAE

**Amblystegium serpens* (Hedw.) Schimp. in B.S.G. 2017.
Campylium chrysophyllum (Brid.) J. Lange. 1970.
C. hispidulum (Brid.) Mitt. 2019.
**Hygroamblystegium tenax* (Hedw.) Jenn. var. tenax. 1980.

**Leptodictyum humile* (P. Beauv.) Ochyra. 2018. Common in Salem Plateau.
**L. riparium* (Hedw.) Warnst. 2046.

ANOMODONTACEAE
**Anomodon attenuatus* (Hedw.) Hueb. 1981.
**A. minor* (Hedw.) Fuernr. 2031.
A. rostratus (Hedw.) Schimp. 1960.

AULACOMNIACEAE
Aulacomnium heterostichum (Hedw.) Bruch & Schimp. in B.S.G. 1982.

BRACHYTHECIACEAE
Brachythecium acuminatum (Hedw.) Aust. var. *acuminatum*. 1983.
B. oxycladon (Brid.) Jaeg. 1965.
**Bryhnia graminicolor* (Brid.) Grout. 2032.
Eurhynchium hians (Hedw.) Sande-Lac. 2016.
Steerecleus serrulatum (Hedw.) Robins. 1971.

BRYACEAE
**Bryum capillare* Hedw. 1984.

BUXBAUMIACEAE
**Diphyscium foliosum* (Hedw.) Mohr. 1977.

DICRANACEAE
**Dicranum condensatum* Hedw. 1961.
D. scoparium Hedw. 1956.
**D. spurium* Hedw. 1976. Uncommon in Salem Plateau. Reported in only four other Salem Plateau counties and is northernmost station in Missouri.

ENTODONTACEAE
Entodon seductrix (Hedw.) C. Muell. 1966.

FISSIDENTACEAE
Fissidens taxifolius Hedw. 2003.

FUNARIACEAE
**Physcomitrium pyriforme* (Brid.) Hampe. 2102.

GRIMMIACEAE
Schistidium apocarpum (Hedw.) Bruch & Schimp. in B.S.G. 1991.

HEDWIGIACEAE
**Hedwigia ciliata* (Hedw.) P. Beauv. 1959.

HYPNACEAE
**Homomallium adnatum* (Hedw.) Broth. 2004.
Platygyrium repens (Brid.) Schimp. in B.S.G. 1962.
**Pylaisiella selwynii* (Kindb.) Crum et al. 2000.

LESKEACEAE
Haplocladium virginianum (Brid.) Wat. & Iwats. 1968.
**Leskea gracilescens* Hedw. 1989.

LEUCOBRYACEAE
**Leucobryum albidum* (Brid. ex P. Beauv.) Lindb. 1955.
L. glaucum (Hedw.) Aongstr. in Fries. 2021.

LEUCODONTACEAE
**Leucodon julaceus* (Hedw.) Sull. 2038. Very common throughout Interior Highlands, but first record in a border county.

MNIACEAE
**Plagiomnium ciliare* (C. Mull.) T. Kop. 1969.
P. cuspidatum (Hedw.) T. Kop. 1973.

ORTHOTRICHACEAE
**Orthotrichum pusillum* Mitt. 1999.

POLYTRICHACEAE
Atrichum angustatum (Brid.) Bruch & Schimp. in B.S.G. 1990.
A. undulatum (Hedw.) P. Beauv. 2005.
Polytrichum juniperum Hedw. 1954.
**P. ohioense* Ren. & Card. 1979.

POTTIACEAE
**Barbula unguiculata* Hedw. 2101.
Tortella humilis (Hedw.) Jenn. 1974.

Weissia controversa Hedw. 1985.

THELIACEAE
Thelia asprella Sull. in Sull. & Lesq. 1963.

THUDIACEAE
**Thuidium delicatulum* (Hedw.) Schimp. in B.S.G. 1957.

Acknowledgments. The author wishes to thank the Koenig and Vanderbilt families for their interest in this project and allowing free access to the property, Sue Vanderbilt for her inspired specimen collecting and Bruce Allen for graciously sharing his expertise.

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Distribution and ecology of *Thelomma ocellatum* in western North America

Bruce McCune[1] and Roger Rosentreter[2]

Thelomma ocellatum (Körb.) Tibell is a thick gray verrucose crust with dark granular sorediod isidia. Although it is frequently sterile, one can often find apothecia with a quick search in the field. The apothecia are reminiscent of *Cyphelium inquinans* (Sm.) Trev., although they are consistently imbedded in a thalline margin. Some thick specimens of *Cyphelium* with sessile to partly immersed apothecia can be very similar to *Thelomma* (*T. ocellatum* and *T. occidentale* (Herre) Tibell), but *Thelomma* can be distinguished reliably by its pale exciple sides in contrast with the blackish exciple of *Cyphelium* (section an apothecium and observe under a dissecting microscope or compound microscope). Furthermore, *Thelomma ocellatum* is always sorediate-isidiate.

Thelomma ocellatum was first reported for North America by Weber (1967) as *Cyphelium ocellatum* (Körb.) Trev. The specimen on which this was based was later reassigned to *Thelomma occidentale* (Tibell 1976). The first valid report of *T. ocellatum* from North America was by Tibell (1978) who distributed material from Riverside County, California in his exsiccatae. No more reports were made until it was discovered at about the same time in Idaho (Rosentreter, unpublished) and British Columbia (Goward and Thor 1992).

Subsequent work has shown this species to be common between the Cascade crest and the Continental Divide and sporadic west of the Cascade and Sierra crests (Fig. 1). We searched regional and national herbaria (ALTA, COLO, ID, MONT, MONTU, ORE, OSC, SRP, UBC, UC, US, WIS, WTU, and the herbaria of John Davis, Trevor Goward, and the authors) and recorded new locations in the Pacific Northwest and Rocky Mountains. The species was absent from most herbaria, although we found a few specimens of *Thelomma ocellatum* under the name *Cyphelium inquinans*.

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Distribution

Although *Thelomma ocellatum* has long been known from Europe and Scandinavia (Tibell 1976), it has been reported only recently from North America (Tibell 1978, Goward and Thor 1992). It is now known from central British Columbia south to southern California and inland to central Montana. It is uncommon west of the Cascade crest in Oregon and Washington, and is not known from extreme coastal areas. Although California has not been searched adequately, it appears to be common in northeast California and sporadic south of there, in both the Sierra foothills and Coast Ranges.

Ecology

Thelomma is very specific as to substrate, always occurring on bare wood. It is clearly nitrophilous, being largely restricted to bird perches. The commonest such sites in western North America are fenceposts. It also occurs on old stumps, dead branch stubs and exposed, elevated tree roots on tip-ups.

The nitrophilous habit is most clearly illustrated by studying the distribution of *Thelomma* on the fan of tree roots on tip-ups. It occurs on not all of the roots but only on those that are frequently used as bird perches. On a typical tip-up, a few roots receive most of the bird traffic, and these same roots support *Thelomma*, while the others roots have other lichens but no *Thelomma*. This pattern was seen in several locations in Oregon and Montana.

Thelomma ocellatum disperses primarily by vegetative means, but was seen sparingly fertile at numerous North American locations. Both the spores and vegetative diaspores are, in this case, probably dispersed in a similar fashion. Unlike most ascomycetes which forcibly eject spores from the ascus, *Thelomma* and other mazaedium-producing species accumulate a mass of spores that are then removed by some other agent (Tibell 1994). This is essentially the same strategy used by sorediate and isidiate species, since they too accumulate diaspores that are removed by an external force, rather than being liberated by an internal force. The common association of *Thelomma ocellatum* with bird perches strongly suggests that the species is most frequently dispersed among sites by birds. Tolerance of high nutrient levels, strong desiccation, and high light are characteristics of the species which allow birds to be the primary agents for dispersal.

The likelihood of finding *Thelomma* on a fencepost or other wood structure increases with the age of that structure. This may result simply from a longer time for the arrival of propagules. An additional possibility is that the character of the substrate improves with age: porosity, water absorbency, and accumulation of nutrients and minerals. In any case, we have not seen *Thelomma ocellatum* on bark, so natural substrates require at least the prerequisite time needed to grow, die, and shed their bark before colonization is possible.

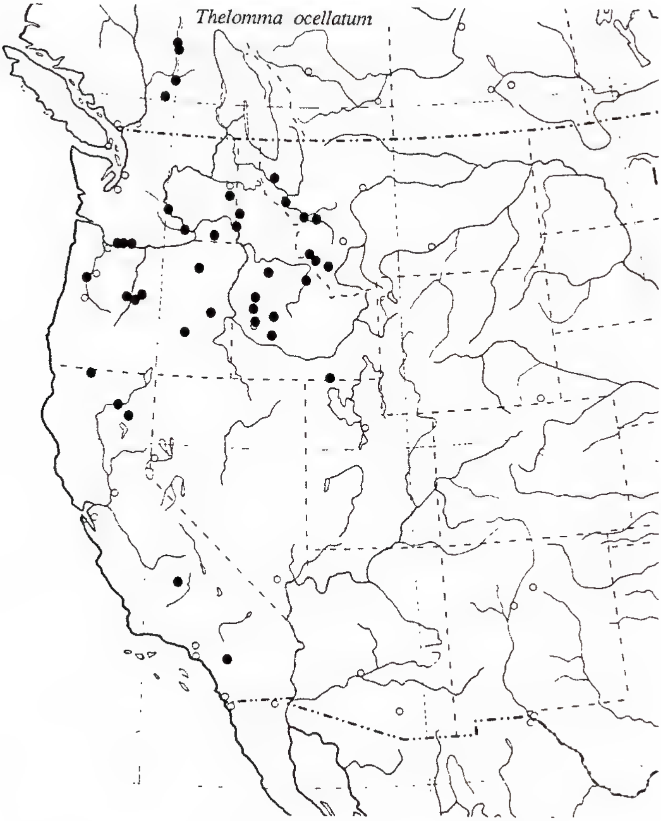

Figure 1. Distribution of *Thelomma ocellatum* in North America. Map adapted from Goode Basemap.

Thelomma ocellatum occurs on wood of both conifers and hardwoods. Hardwood substrates include *Purshia* and *Robinia*. Coniferous substrates include *Abies*, *Juniperus*, *Larix*, *Pinus*, *Pseudotsuga*, and *Thuja*.

In our experience *Thelomma* is tolerant of wide-open habitats. However it also occurs in partial shade, such as in open forests of *Pinus ponderosa*, *Pinus albicaulis*, or *Juniperus*.

Although most of the known locations are at lower elevations (below 1000 m), we have recorded it as high as 2750 m (Pioneer Range, Beaverhead County, Montana) and 1900 m (near Burgdorf, Idaho County, Idaho).

Many of the wooden structures on which *Thelomma ocellatum* occurs have some historical significance. The weathered wood structures of early settlements are prime habitat for *Thelomma*. These old fences and buildings not only have historical significance, but they also support distinctive and interesting lichen communities. Nevertheless anthropogenic wood tends to be ignored by lichenologists (in favor of well-preserved natural ecosystems), such that species like *Thelomma* have escaped our attention. In this case, examination of the substrate has resulted in expanding the number known locations in North America from two to over 35. Further study of old wood is likely to result in interesting additions to North American lichenology.

Acknowledgments. We thank Leif Tibell for identifying the original material from Idaho, Ann DeBolt and John Davis for helping to locate additional sites, Trevor Goward for providing information from British Columbia, Wayne Owen for pursuing the species in Idaho, and curators of the herbaria listed above.

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The Genera *Ceratodon, Distichium, Pleuridium,* and *Saelania* in Maine.

Bruce Allen[1]

The Ditrichaceae are a family of small erect mosses usually found on bare, often disturbed, soil. They are sporophytically diverse but gametophytically nondescript and so the family is difficult to characterize. There are five Ditrichaceae genera known in Maine: *Ceratodon*, *Distichium* (see Allen 1995), *Ditrichum*, *Pleuridium*, and *Saelania*.

DITRICHACEAE

Plants small to minute, gregarious or tufted, erect, simple, forked or cladocarpous. Leaves lanceolate, acuminate or subulate; costa single; cells short or elongate, smooth or mammillose. Perichaetia and sporophytes terminal. Capsules exserted or immersed, stomata present or absent; annuli well-developed or absent; peristome present or absent.

Key to the genera

1. Leaves distichous, plants appearing flattened . . . . *Distichium*
1. Leaves in more than two rows, plants not flattened 2
    2. Plants bluish-glaucous due to a mealy covering of filaments on the stems and lower parts of the leaves . . . . *Saelania*
    2. Plants greenish-yellow without whitish filaments on stems and leaves 3
3. Leaf margins irregularly notched to serrate above, leaf cells sharply quadrate to short rectangular; capsules red-purple, horizontal, asymmetric, strumose, strongly furrowed . . . . *Ceratodon*
3. Leaf margins entire, serrulate or sinuose-serrulate above, leaf cells rectangular to linear; capsules immersed, cleistocarpous OR erect and symmetric to somewhat inclined, not strumose, smooth or indistinctly furrowed when dry 4
4. Capsules immersed, cleistocarpous . . . . *Pleuridium*
4. Capsules exserted, operculum and peristome present . . . . *Ditrichum*

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1. *Ceratodon* Brid., Bryol. Univ. 1: 480. 1826.

Plants small, densely tufted. Stems erect, simple or forked, densely foliate. Leaves ovate-lanceolate, gradually acuminate, acute, keeled; margins strongly reflexed to revolute, notched or irregularly serrate near the apex; costa single, percurrent to short excurrent; cells smooth, elongate below, subquadrate above, thick-walled. Dioicous. Setae erect, elongate; capsules exserted, suberect; stomata present; annuli large, complex, revoluble; opercula conic; peristome single, teeth 16. Calyptrae cucullate.

Ceratodon purpureus (Hedw.) Brid., Bryol. Univ. 1: 480. 1826.

> *Dicranum purpureum* Hedw., Sp. Musc. Frond. 136. 1801.
> *Ceratodon purpureus* var. *aristatus* Aust., Musci Appal. no. 117. 1870.

Plants greenish-yellow. Secondary stems, 2 cm long, branches sparse and irregularly spaced. Leaves crowded, curved and contorted when dry, leaves ovate-lanceolate to lanceolate, 1.5—2 mm long, apex acute to acuminate, margins recurved nearly to the apex, coarsely and irregularly toothed. Upper leaf cells subquadrate to quadrate, 7—9 µm long, basal cells short-rectangular, alar cells not differentiated. Dorsal surface of costa covered with quadrate cells. Setae 2 cm long, pale yellow to reddish, smooth; capsules suberect to inclined, ovoid-cylindrical, 2 mm long, yellow, urn sulcate when dry; stomata superficial; opercula conic; peristome teeth reddish-yellow, lanceolate, lightly-papillose, split nearly to the base. Spores rounded, 11—15 µm, finely papillose.

A common, weedy species able to tolerate dry, open, sunny conditions. Found on soil or sandy areas often in disturbed places (roadsides, sidewalks, roofs), also on charcoal, burned over soil, rock ledges or crevices, and rotting wood. In Maine known from Androscoggin (*Allen 14723* MO), Aroostook (*Norton* MAINE), Cumberland (*Allen 15941* MO), Franklin (*Allen 10271* MO), Hancock (*Redfearn 37751* MO), Kennebec (*Allen 10131* MO), Knox (*Allen 6060* MO), Lincoln (*Allen 16256* MO), Oxford (*Allen 10063* MO), Penobscot (*Allen 16528* MO), Sagadahoc (*Allen 10180* MO), Somerset (*Allen 9362* MO), Waldo (*Allen 10362* MO), Washington (*Norton* MAINE), and York (*Allen 13040* MO) counties. Reported but not yet verified from Piscataquis (Kennedy & Collins, 1901).

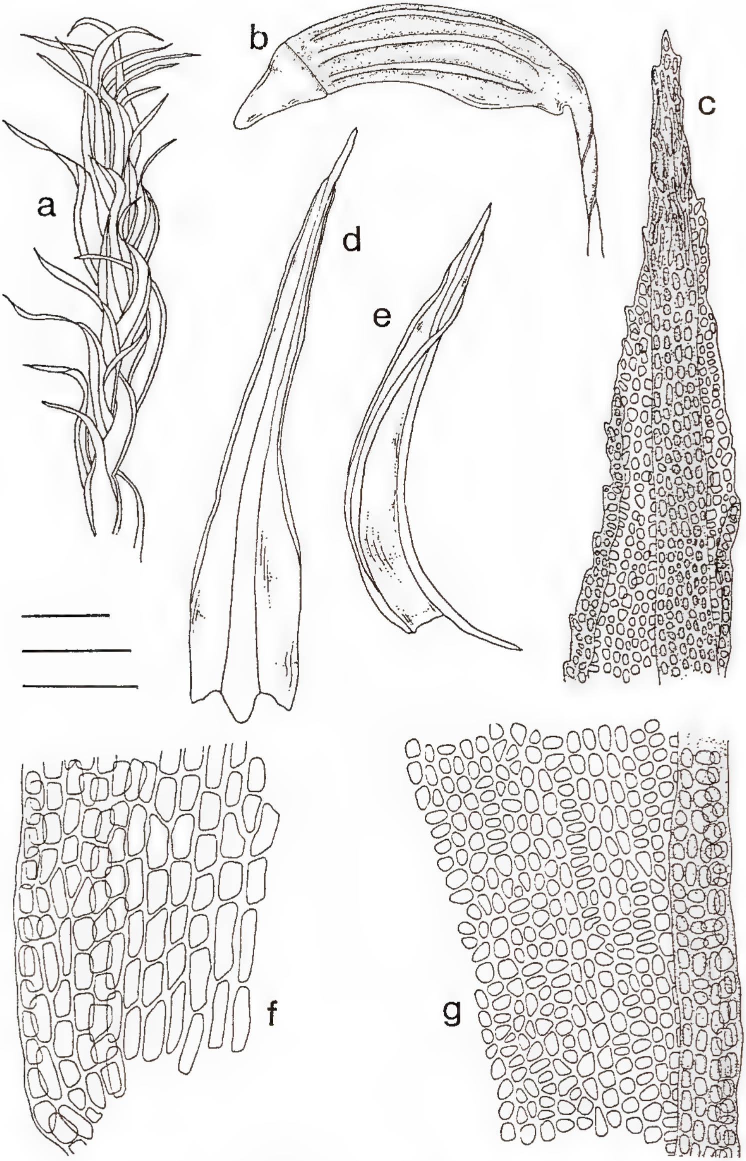

Figure 1. *Ceratodon purpureus*. a. Habit. b. capsule. c. Leaf apex. d. & e. Leaves. f. Basal leaf cells and margin. g. Median leaf cells and margin. Scales in mm: Bar 1 = 0.05 (f,g); Bar 1 0.5 (b); Bar 2 = 0.45 (a); Bar 3 = 0.1 (c); Bar 3 = 0.5 (d,e).

Ceratodon purpureus is generally recognized by its dark-red, asymmetric, and subinclined capsules that are strongly furrowed when dry. If sporophytes are absent it can be difficult to identify since its gametophytes have the habit of a *Bryum*, but the microscopic aspect of the Pottiaceae. Crum and Anderson (1981) emphasized the strongly reflexed to recurved leaf margins, irregularly notched apical serrations and the firm, smooth, subquadrate to quadrate upper cells of *Ceratodon purpureus* as aids in recognizing sterile collections. The genus has been revised by Burley and Pritchard (1990).

2. *Distichium* B.S.G., Bryol. Eur. 2: 153. 1846.

Plants slender, elongated, densely tufted. Stems erect, unbranched or forked. Leaves distichous, abruptly narrowed to a rough, spreading, linear subula from an oblong, erect, sheathing base; costa single, strong, filling the subula; cells subquadrate to subrectangular above, linear below, alar cells absent. Autoicous; perigonia axillary. Setae erect elongate; capsules exserted; annulus large, compound; opercula conic; stomata superficial; peristome of 16 teeth. Calyptrae cucullate, smooth.

Distichium capillaceum (Hedw.) B.S.G., Bryol. Eur. 2: 156. 1846.

Cynodontium capillaceum Hedw., Sp. Musc. 57. 1801.

Plants green to yellow-green, 1—6 cm long. Leaves horizontally spreading, oblong-lanceolate, 3—5 mm long; margins erect, hyaline-bordered at base; upper laminal cells small, subquadrate to short rectangular, coarsely papillose, basal cells linear to oblong-linear, hyaline, smooth. Setae 8—20 mm long, red to reddish-brown (occasionally yellowish); capsules erect, to slightly inclined, cylindrical, 1—2 mm long, brown; peristome teeth lanceolate, split or perforate nearly to the base into 2 nearly equal divisions, papillose-roughened or smooth with oblique striations. Spores rounded, 16—25 µm, papillose.

Habitat. In Maine known from Piscataquis (*Porter* MO) and Somerset (*Allen 9360* MO) counties.

The distichous leaves and strongly clasping leaf bases of this species give the stems a smooth, flat appearance that may be mistaken for *Fissidens*, but the

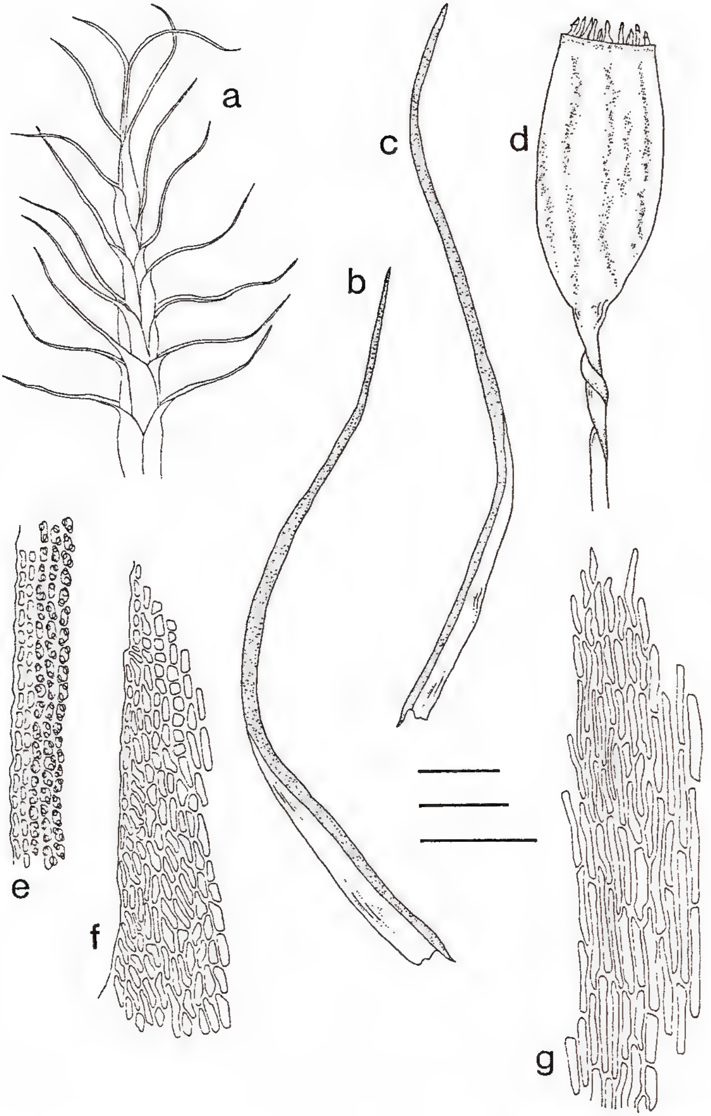

Figure 2. *Distichium capillaceum*. a. Habit. b. & c. Leaves. d. Capsule. e. Upper leaf cells and part of costa. f. Median leaf cells at leaf shoulder. g. Basal leaf cells. Scales in mm: Bar 1 = 1.0 (a); Bar 2 = 0.05 (e,f,g); Bar 3 = 0.5 (b,c,d).

leaves lack vaginant laminae. The leaves are distinctive in their long, roughened, widely spreading subula (more than twice the length of leaf base) that are abruptly contacted from sheathing, white bases.

3. *Pleuridium* Rabenh., Deutschl. Krypt. Fl. 2(3): 79. 1848. nom. cons.

Plants small, gregarious or loosely tufted. Stems erect, unbranched or forked. Leaves erect-spreading or subsecund, gradually or abruptly narrowed to a subula from a broad base, ovate-lanceolate; costa single, strong, filling the subula, excurrent; cells rectangular to linear above, rectangular below, alar cells absent. Autoicous. Setae short; capsules immersed; annulus and opercula not differentiated; stomata superficial; peristome not differentiated. Calyptrae cucullate, smooth.

Pleuridium subulatum (Hedw.) Rabenh., Deutschl. Krypt.-Fl. 2(3): 79. 1848.

Phascum subulatum Hedw., Sp. Musc. Frond. 19. 1801.

Plants yellow-green, scattered to loosely tufted, 3—6 mm high. Leaves 1.5—4 mm long, loosely erect to erect-spreading, gradually to abruptly subulate above, oblong or ovate at base; margins erect or incurved above, entire or sinuose-serrulate above; costa percurrent or excurrent, filing most of the subula, cells small, firm, linear or linear-flexuose above, oblong-rhomboidal or linear near shoulders, short to long-rectangular at base. Autoicous and paroicous, antheridia borne in axillary buds or naked in axils of the upper leaves. Setae 0.4—1 mm long; capsules 0.8—1.0 mm, ellipsoid to ovoid, bluntly apiculate. Spores 24—41 µm finely papillose. Calyptra cucullate.

On bare soil in old fields, lawns, stream banks. In Maine known from Cumberland (*Lowe* MAINE), Kennebec (*Merrill* MO), and York (*Blake p.p.* MAINE) counties. Reported but not yet verified Androscoggin (Parlin 1939) and Hancock counties (Greenwood 1927).

Pleuridium subulatum is a spring ephemeral that often occurs mixed with *Ditrichum pallidum* on bare, disturbed soil. The plants are autoicous and produce abundant globular, immersed sporophytes in April through June, but due to its small size and ephemeral life style it is frequently overlooked and not often collected. A determined search for the species in open disturbed areas at the

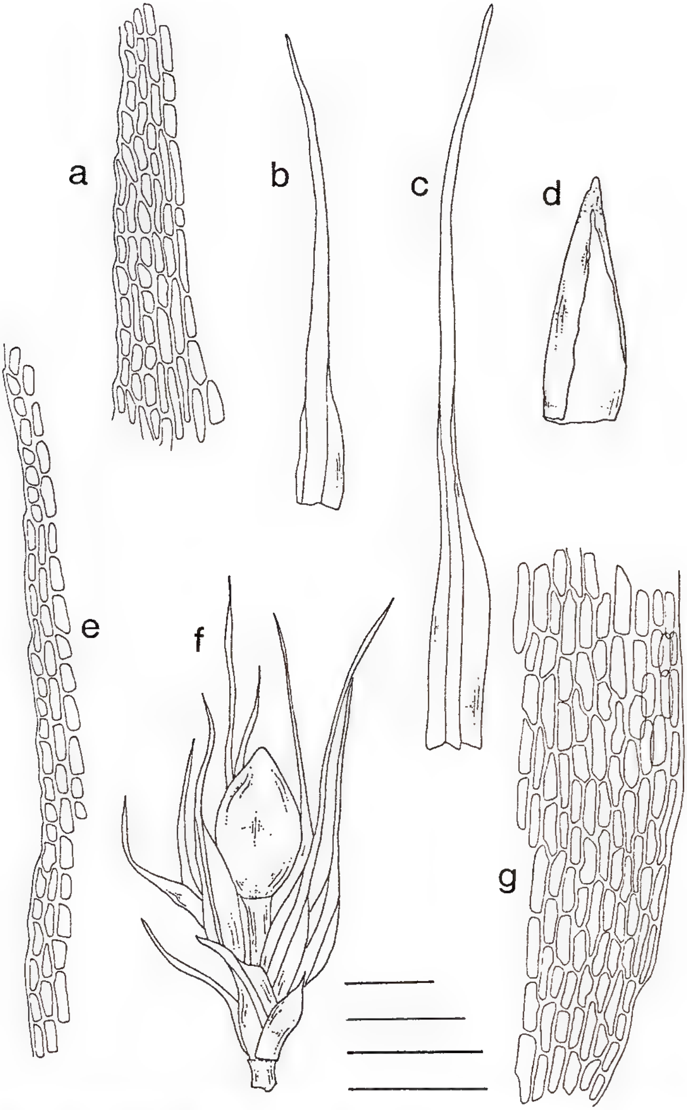

Figure 3. *Pleuridium subulatum*. a. Median leaf cells and margin. b. & c. Leaves. d. Calyptra. e. Upper leaf cells and margin. f. Habit with capsule. g. Basal leaf cells and margin. Scales in mm: Bar 1 = 0.05 (a,e,g); Bar 2 = 0.5 (b,c); Bar 3 = 0.5 (d); Bar 4 = 1.0 (f).

proper time of year will usually find it. There is an entire group of small, ephemeral, cleistocarpous mosses called "pygmy mosses" that include the genera *Ephemerum*, *Micromitrium*, *Archidium*, *Bruchia*, *Phascum*, and *Aphanorrhegma*. Despite sharing a common type of sporophyte this group is polyphyletic and often the gametophyte is a better indicator of phylogenetic relationships; for example, *Pleuridium* is gametophytically very close to *Ditrichum* and sporophytically radically different, but the genera are so closely related they can hybridize to produce a sterile sporophyte (see Anderson & Snider 1982).

4. *Saelania* Lindb., Utkast. Eur. Bladmoss. 35. 1878.

Plants small, tufted, yellowish green with a fine bluish-green, mealy covering over the leaves and stems. Stems erect, simple or forked. Leaves lanceolate, gradually acuminate, acute, keeled; margins plane to somewhat reflexed, notched or irregularly serrate in upper half; costa single, percurrent to short excurrent, toothed at back; cells smooth, quadrate to short rectangular throughout, thick-walled. Autoicous; perigonia terminal on branches. Setae erect, elongate; capsules exserted, cylindric, erect and symmetric, smooth to wrinkled-striate when dry; stomata present, superficial; annuli large, complex, persistent; opercula rostrate; peristome single, teeth 16, split nearly to the base, densely papillose. Calyptrae cucullate, smooth.

Saelania, a monotypic genus, has a *Ditrichum*-type capsule and *Ceratodon*-like leaves. The stems and lower parts of leaves are glaucous due to the presence of a dense covering of bluish-green filaments. The genus is named for a Finnish botanist, Anders Thiodolf Saelan.

Saelania glaucescens (Hedw.) Broth. in Bonmanss. & Broth., Herb. Mus. Fenn. 2: 53. 1894.

Trichostomum glaucescens Hedw., Sp. Musc. Frond. 112. 1801.
Leptotrichum glaucescens (Hedw.) Hampe in Schimp, Syn. Musc. Eur. 146. 1860.
Ditrichum glaucescens (Hedw.) Hampe, Flora 50: 182. 1867.
Saelania caesia (P. Beauv.) Lindb., Utkast Eur. Bladmoss. 35. 1878.
Bryum caesium Vill. ex P. Beauv., Prodr. Aethéogam. 45. 1805.

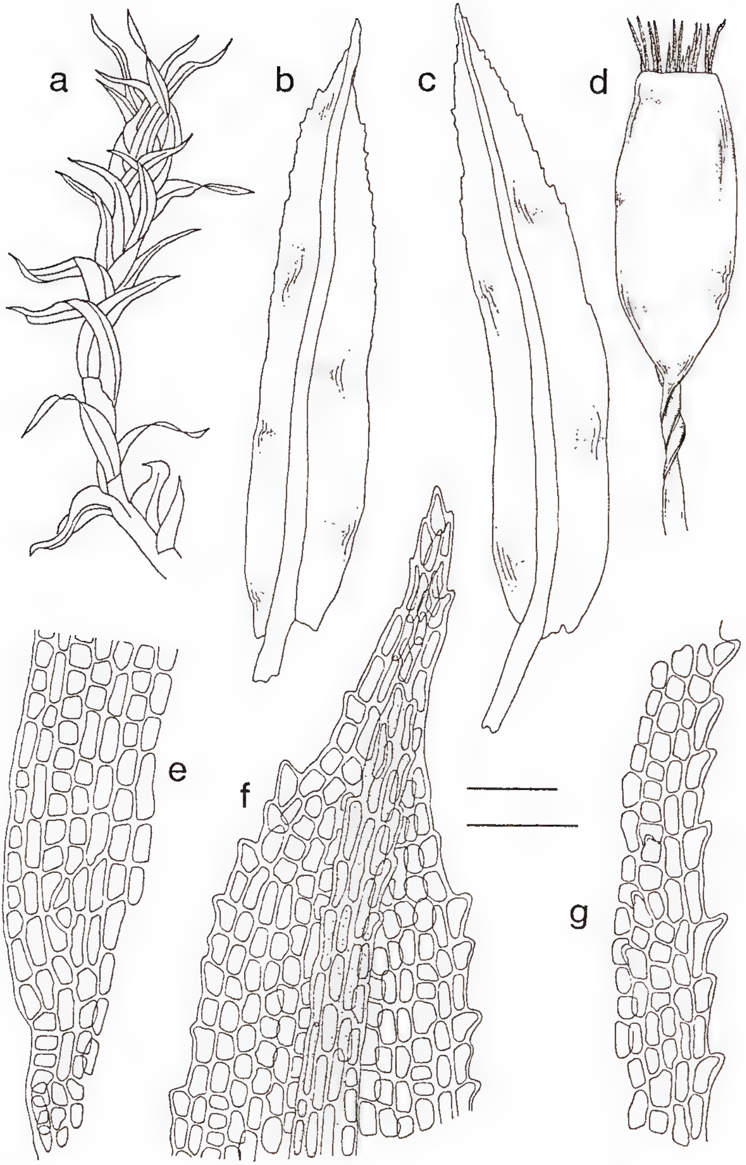

Figure 4. *Saelania glaucescens*. a. Habit. b. & c. Leaves. d. Capsule. e. Basal leaf cells and margin. f. Leaf apex. g. Median leaf cells and margin. Scales in mm: Bar 1 = 0.05 (e,f,g); Bar 1 = 0.2 (b,c); Bar 1 = 0.5 (d); Bar 2 = 1.0 (a).

Plants to 1 cm high. Leaves 1—2 mm long, erect-patent to erect-contorted when dry, narrowly lanceolate, gradually acuminate, margins irregularly and sometimes doubly toothed above, plane to narrowly reflexed below; cells quadrate to short rectangular throughout, 12—24 µm x 6—8 µm, firm-walled, smooth, occasionally with bistratose areas along the margins and cells projecting as teeth. Setae brownish-yellow 5—8 mm long; capsules brown, 2 mm long; operculum 1 mm long; peristome deep red, densely papillose, 280 µm long. Spores 14—16 µm, lightly papillose.

On soil in crevices of rock outcrops and cliffs. In Maine known from Franklin (*Adams 13811* MAINE), Kennebec (*Lowe* MAINE), Oxford (*Adams 13821* MAINE), and Somerset (*Allen 9286* MO) counties. Reported but not yet verified from Androscoggin (Parlin 1939) county.

Saelania glaucescens is a boreal species that can be reliably field identified by the bluish-green filaments that cover the stems and lower leaves. These filaments have been shown to be a secretion from the plant rather than an algal contamination. Microscopically its leaves are similar to those of *Ceratodon purpureus* in having irregularly notched to serrate leaf margins, short firm-walled leaf cells, and stout percurrent to shortly excurrent costae. It has a typical *Ditrichum* sporophyte: long exserted, erect, symmetric capsules and densely papillose, fully divided peristome teeth.

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Some lichens from Melville, Bathurst, and Moore Islands in the Canadian Arctic Archipelago.

John W. Thomson[1] and George W. Scotter[2]

Abstract. *65 species of lichens are reported from three of the Canadian Arctic islands.*

Although our knowledge of lichen distribution in the Canadian Arctic is well advanced (Thomson 1984), it is far from complete. A survey from July 22-25, 1992, of potential National park sites in the Queen Elizabeth Islands, Northwest Territories, provided the opportunity for the collection of lichens at four sites on Bathurst (117), Melville (41), and Moore (0) islands. The number of lichens previously known from those islands is indicated within the brackets above (Thomson 1990). This paper reports the 65 lichens collected at those localities as an additional step in increasing our knowledge of distribution patterns in that vast area. Voucher specimens are stored at WIS. All collections are by the second author, identifications are by the first author.

The specimens were collected at the following localities:

M1. Murray Inlet, Melville Island, N. W. T. 75°19′ N, 114°33′ W; elev. 20 m; July 22, 1992. On rock outcrops and surrounding vegetation above the valley floor. Sedge meadow predominates on the low ground and polar desert on the high ground. Nos.99,701-99,739.

B1. Gregory Peninsula, Bathurst Island, N. W. T. 75°28′N, 97°30′W; elev. 30 m; July 23, 1992. On chips of old whale bone and surrounding cover from an old camp site. The vegetation on Bathurst Island ranges from sedge meadow in the lowlands to polar desert on uplands.
Nos. 99,740-99,755.

B2. Bracebridge Inlet, Bathurst Island, N. W. T. 75°40′ N, 99°43′W; elev. 15 m; July 23, 1992. The vegetation is sparse on the polar desert uplands and relatively diverse in the wet meadows. Nos. 99,756-9,792.

MIS. Moore Island, N. W. T. 74°58′N, 98°33′W; elev. 2 m; July 24, 1992. The vegetation on this island is mainly polar desert.
Nos. 99,793-99,798.

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List of species.

Agyrophor lyngei (Schol.) Llano **M1**: 99,704, 99,707. On rocks.
Alectoria nigricans (Ach.) Nyl. **M1**: 99,722, 99,726.On humus.
Aspicilia caesiocinerea (Nyl. ex Malbr.) Arnold **M1**; 99,728. On shale.
A. caesiopruinosa (Magnusson) Thomson **B2**: 99,756. On shale.
A. subplicigera (Magnusson) Oxner **B2**: 99,757. On shale.
Buellia papillata (Sommerf.) Tuck. **B1**: 99,740, on bone; **B2**: 99,758, 99,759. Over mosses.
B. stigmatea (Ach.) Koerber **M1**: 99,739; **B2**: 99,760. On shale.
Caloplaca crenularia (With.) Laundon **B1**: 99,742. On bone.
C. exsecuta (Nyl.) Dalla Torre & Sarnth. **M1**: 99,735. On shale.
C. tiroliensis Zahlbr. **B1**: 99,741. On humus.
Candelariella aurella (Hoffm.) Zahlbr. **B2**: 99,761, over moss; 99,763, on shale.
Catapyrenium waltheri (Krempelh.) Koerber **B2**: 99,763. Over mosses.
Cetraria cucullata (Bell.) Ach. **M1**: 99,721. Among mosses.
C. nivalis (L.) Ach. **MIS**: 99,793. Among mosses.
C. tilesii Ach. **B2**: 99,764; **MIS**: 99,794. On mosses.
Cladonia coccifera (L.) Willd. **M1**: 99,718. On humus.
C. pocillum (Ach.) O. Rich. **B1**: 99,708, 99,703; **B2**: 99,765, 99,766, 99,767; **MIS**; 99,795. On humus.
Dimelaena oreina (Ach.) Norm. **M1**: 99,736. On shale.
Evernia perfragilis Llano **B2**: 99,768. Among mosses.
Farnoldia jurana (Schaer er) Hertel **B2**: 99,769. On shale.
Fulgensia bracteata (Hoffm.) Räsänen **B2**: 99,770. On soil.
Hypogymnia austerodes Nyl. **M1**: 99,714. On soil.
H. subobscura (Vainio)Poelt **M1**: 99,715; **B2**: Over hunus.
Lecanora crenulata Hook. **B2**: 99,772. A few scattered on shale.
L. dispersa (Pers.) Sommerf. **B1**: 99,764. On bone.
L. epibryon (Ach.) Ach. **B1**: 99,745; **B2**: 99,773. **MIS**: 99,796. On humus.
L. geophila (Th. Fr.) Poelt **M1**: 99,711. Over moss and soil.
L. nordenskioldii Vainio **B2**: 99,774. On shale.
L. polytropa (Hoffm.) Rabenh. **M1**: 99,737. On shale.
Lecidea lapicida (Ach.) Ach. **M1**: 99,733. On shale.
L. ramulosa Th. Fr. **B1**: 99,746. On humus.
L. subplumbea Anzi **M1**: 99,732. On shale.
Lecidella stigmatea (Ach.) Hertel & Leuck. **B2**: 99,775. On shale.
Lepraria arctica (Lynge) Wetm. **M1**: 77,720. On soil.

Lopadium pezizoideum (Ach.) Koerber **M1**: 99,710. On soil.
Melanelia elegantula (Zahlbr.) Essl. **M1**: 99,702. On humus.
Micarea cf. *ternaria* (Nyl.) Vezda **B2**: 99,776. On shale.
Ochrolechia frigida (Sw.) Lynge **B2**: 99,777. On humus.
Omphalodiscus virginis (Schaerer) Schol. **M1**: 99,705. On rocks.
Orphniospora moriopsis (Mass.) Hawksw. **M1**: 99,729. On shale.
Peltigera leucophlebia (Nyl.) Gyelnik **M1**: 99,712. Among mosses.
P. polydactyla (Necker) Hoffm. **MI**: 99,717. On mosses.
P. rufescens (Weis.) Humb. **M1**: 99,727. Among mosses.
Pertusaria bryophaga Erichsen **B2**: 99,778. Over mosses.
P. dactylina (Ach.) Nyl. **B2**: 99,779, 99,780. On humus.
P. cf. *panyrga* (Ach.) Mass. **B2**: 99,781. On hunus. In poor condition.
Phaeophyscia sciastra (Ach.) Moberg. **B1**: 99,748, on humus; 99,749, on bone; **B2**: 99,782, on shale; **MIS**: 99,797, on soil.
Physcia caesia (Hoffm.) Fürn. **M1**: 99,701, on rock; **B1**: 99,747, on bone.
P. dubia (Hoffm.) Lettau **M1**: 99,703. On humus.
Physconia muscigena (Ach.) Poelt **M1**: 99,724; **B1**: 99,750; **B2**: 99,783; 99,784. Over humus.
Polyblastia cupularis Mass. **B2**: 99,785. On shale.
Porpidia speirea (Ach.) Krempelh. **B2**: 99,786. On shale.
Pseudephebe pubescens (L.) Choisy **M1**: 99,713. On soil.
Rhizocarpon geminatum Koerber **M1**: 99,734. On shale.
R. geographicum (L.) DC. **M1**: 99,730. On shale.
Rinodina bischoffii (Hepp) Massal. **B2**: 99,787. On shale.
R. roscida (Sommerf.) Arnold **B1**: 99,751. On mosses.
R. turfacea (Wahlenb.) Körber **M1**: 99,725; **B2**: 99,788, 99,789. On humus and mosses.
Sporastatia testudinea (Ach.) Massal. **M1**: 99,731, 99,738. **B2**: 99,790. On shale.
Stereocaulon paschale (L.) Hoffm. **M1**: 99,719; **B2**: 99,791. On humus.
Thamnolia vermicularis (Swartz) Ach. ex Schaerer **M1**: 99,716; **B1**: 99,752. On humus and mosses.
Umbilicaria hyperborea (Ach.) Hoffm. **M1**: 99,706. On shale.
Usnea sphacelata R. Br. **M1**: 99,709. On shale rocks.
Xanthoria elegans (Link.) Th. Fr. **M1**: 99,723; **B1**: 99,753; 99,754; **B2**: 99,792; **MIS**: 99,798. On mosses and on old bone.
X. sorediata (Vainio) Poelt **B1**: 99,755. On bone. This is a far north record for this species.

Literature Cited

Thomson, J. W. 1984. *American Arctic Lichens I.* The Macrolichens. Columbia University Press. 504 pp.

Thomson, J. W. 1990. Lichens in the Canadian Arctic Islands. *In* C. R. Harington (ed.) *Canada's Missing Dimension.* Vol. 1: 385-420. Canadian Museum of Nature, Ottawa.

Responding to Dr. Pursell

Dr. Ron Pursell has been kind enough to point out that in a recent survey of the bryophytes and lichens of Rock Hill Preserve, Florida (*Evansia* 12(1) 1995) by Griffin, Harris and Buck, the authors failed to include reference to an earlier paper by Pursell, Redfearn and Reese (*Bryologist* 59(4) 1956) in which some of the Rock Hill taxa of bryophytes are listed. We both acknowledge and regret the oversight. **Dana Griffin, III** **Richard C. Harris** **William R. Buck**

Guide to contributors to *EVANSIA*

The aim of *Evansia* is to provide a vehicle for the presentation and exchange of useful information on North American bryophytes and lichens. Articles are frequently popular in nature rather than technical and are intended to teach and inform both amateurs and professionals. The articles include, but are not restricted to, announcements of and reports on forays and meetings, presentations of techniques and aids for studying and curating lichens and bryophytes, and reports on local floras. Checklists and papers documenting new regional, state, or county records must include voucher specimens (collector and collection number) and an indication of where the specimens are deposited or a literature reference.

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A Preliminary Checklist of Bryophytes of Marin County, California

Paul Yurky[1]

Abstract. *One hundred twenty-three taxa (119 species and 4 varieties) of mosses, 65 taxa (62 species and 3 varieties) of liverworts, and 4 taxa (3 species and 1 variety) of hornworts are reported from Marin County, California. Fourteen mosses and nine liverworts are newly collected in the county. One liverwort is reported new to California.*

Although floristic studies of vascular plants have been published for both California and Marin County, a moss flora of California does not exist, and only one state-wide liverwort flora has been published, that by Howe in 1899. Howe (1899) recorded 82 species of liverworts in 35 genera representing 29 modern families and 4 anthocerotes in one genus and one family for California. Evans (1923) raised the count to 101 species. In 1950, Koch listed 317 species of mosses in 106 genera and 40 families statewide, later raising the count to 320 species (Koch 1954). Harthill et al. (1979) listed 173 species and 6 varieties of mosses in 23 families for southern California.

In addition to my Marin County collections (over 1200 specimens), I examined over 600 herbarium specimens from the University Herbarium, University of California, Berkeley (UC), the Harry D. Thiers Herbarium, San Francisco State University (SFSU), and the California Academy of Sciences and Dudley Herbarium (CAS & DS) to compile the checklist.

The present article reports 3 species and 1 variety of Anthocerophyta, 62 species and 3 varieties of Hepatophyta, and 119 species and 4 varieties of Bryophyta. Based on these numbers, the bryophyte flora of Marin county appears to be rather rich. It contains 25 of 35 liverwort genera reported by Howe and Evans and 57 of the 101 liverwort species, that is, approximately 71% of the genera and 57% of the species. Also found in Marin county are three of the four hornwort species which Howe had listed. As for the mosses, 59% of the genera and 36% of the species listed in Koch's 1954 work were found in Marin county. This diversity is noteworthy given that the county occupies only about 0.34% of the land area of California.

The nomenclature follows Anderson et al. (1990) for mosses and Stotler and Crandall-Stotler (1977) for the hepatics and anthocerotes. Representative collections examined are cited after each entry. Abbreviations used for my collections are AISP for Angel Island State Park, CCSP for China Camp State Park, GGNRA for Golden

---

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Gate National Recreation Area, MMWD for the Marin Municipal Water District watershed lands, MTSP for Mount Tamalpais State Park, PRNS for Point Reyes National Seashore, STSP for Samuel Taylor State Park, and TBSP for Tomales Bay State Park. Volunteer Canyon, Pike County Gulch, and Audubon Canyon Ranch along Highway 1 near Stinson Beach are owned by the Audubon Society. My appreciation is extended to all the preceding localities for allowing me to collect on their lands. My collections are deposited at the Harry D. Thiers Herbarium (SFSU). New county records are labelled with an asterisk. *Metzgeria temperata* Kuwah. is reported new to California.

ANTHOCEROPHYTA

Anthoceros L. emend. Prosk.

punctatus L. Mulford 692, Inverness (CAS & DS); Hoare M-59, Bolinas Rd (SFSU); Yurky 2, North Creek Trail, STSP; Yurky 198, Miwok Meadows, CCSP

Phaeroceros Prosk.

hallii (Aust.) Prosk. Sutliffe, Shaver Creek (CAS & DS); Yurky 167, Bolinas-Fairfax Rd above Alpine Lake, GGNRA; Yurky 251, Visitor Center, AISP

subsp. *carolinianus* (Michx.) Prosk. Mueller 6934, Alpine Dam (UC); Rose 34124, Mt. Tamalpais (CAS & DS); Campbell, Mill Valley (CAS & DS); Yurky 168, Lily Lake, MMWD

pearsoni (M.A. Howe) Prosk. Howell, Sausalito Hills (CAS & DS); Campbell, Mill Valley (CAS & DS)

HEPATOPHYTA

Aneura Dum.

pinguis (L.) Dum. Howell 278, Pt. Reyes (CAS & DS); Sutliffe 24, Mt. Tamalpais (CAS & DS); Mueller 6933, no locality (UC)

Asterella P. Beauv.

bolanderi (Aust.) Underw. Campbell, Mill Valley (CAS & DS); Sutliffe, San Anselmo Canyon (CAS & DS); Mason 2531, Phoenix Lake (CAS & DS)

californica (Hampe) Underw. Howell 754, Angel Island (CAS & DS); Sutliffe, Ross-Fairfax Hills (CAS & DS); Yurky 143, Devil's Gulch Creek Trail, STSP

palmeri (Aust.) Underw. Howell 688, Kentfield (CAS & DS); Sutliffe, Mill Valley (CAS & DS); Sutliffe, San Anselmo Canyon (CAS & DS)

Calypogeia Raddi

fissa subsp. *neogaea* Schust. Wagner 3043, near Muir Woods (UC); Howell 641, Barth's Retreat (CAS & DS); Yurky 12, Bear Valley Trail PRNS; Yurky 200, Audubon Canyon Ranch

muelleriana (Schiffn.) K. Müll. Mason 2526, Phoenix Lake (CAS & DS); Howell

81, Inverness Ridge (CAS & DS) (both preceding as *C. trichomanis*); Yurky 889, Johnstone Trail, TBSP

neesiana (Mass. & Carest.) K. Müll. * Yurky 32, Meadow Trail, PRNS

Cephalozia (Dum. emend. Schiffn.) Dum.

affinis Lindb. *ex* Steph. * Yurky 25, Wildcat Canyon, STSP; Yurky 201, Northridge Trail to Mt. Livermore, AISP

bicuspidata (L.) Dum. Howell 83, Inverness/Pt. Reyes (CAS & DS); Mueller 6931, near Alpine Dam (UC)

lunulifolia (Dum.) Dum. Campbell, Muir Woods (CAS & DS); Hermann 17529, Muir Woods (CAS & DS) (both preceding as *C. media*); Yurky 79, Olema Valley Trail, PRNS

pleniceps (Aust.) Lindb. Campbell, Mill Valley (CAS & DS)

Cephaloziella (Spruce) Steph.

divaricata (Sm.) Schiffn. var. *divaricata* Howell 752, Black Point (CAS & DS); Yurky 75, near Mt. Livermore, AISP; Yurky 907, Back Ranch Meadows, CCSP

var. *scabra* M.A. Howe Campbell, Muir Woods (CAS & DS); Yurky 114, Inverness Ridge Trail, PRNS; Yurky 894, Northside Trail near Rifle Picnic Area, MMWD

gracillima Douin Campbell 54, Lake Lagunitas (CAS & DS)

hampeana (Nees) Schiffn. (Evans 1923); Yurky 108, Eldridge Grade on Mt. Tamalpais, MMWD; Yurky 148, Shell Beach, TBSP

turneri (Hook.) K. Müll. Howell, Mill Valley (CAS & DS); HDT 10317, Phoenix Lake (SFSU); Yurky 205, Audubon Canyon Ranch

Chiloscyphus Corda

pallescens (Ehrh. *ex* Hoffm.) Dum. HDT 40636, Alpine Lake (SFSU)

polyanthus (L.) Corda var. *polyanthus* Howell 451, Mt. Tamalpais (CAS & DS)

var. *rivularis* (Schrad.) Nees Howell 716, Pt. Reyes (CAS & DS); Howell 769, Mt. Tamalpais (CAS & DS); Sutliffe, Lake Lagunitas (CAS & DS)

Conocephalum Wigg.

conicum (L.) Lindb. * Yurky 30, Barnabe Trail, STSP; Yurky 222, North Creek Trail, STSP

Cryptomitrium Aust.

tenerum (Hook.) Aust. Sutliffe, San Anselmo Canyon (CAS & DS); Yurky 133, Steep Ravine Trail, MTSP; Yurky 875, Ross Trail near Phoenix Lake, MMWD

Fossombronia Raddi

hispidissima Steph. Sutliffe 45, Laurel Dell (CAS & DS); Sutliffe, Cascade Rd (CAS & DS)

longiseta Aust. Sutliffe, Eldridge Grade (CAS & DS); Wagner 3042, near Muir Woods (SFSU); Yurky 90, Devil's Gulch Creek Trail, STSP

Frullania Raddi

bolanderi Aust. Howe, Mill Valley (Howe 1899); Yurky 118, Back Ranch

Meadows, CCSP; Yurky 160, Audubon Canyon Ranch

californica (Aust.) Evans Howe, Olema (Howe 1899); Yurky 97, Wildcat Canyon, STSP; Yurky 235, Bootjack Trail, MTSP

franciscana M.A. Howe Howe, Mill Valley (Howe 1899); Yurky 11, Bear Valley Trail, PRNS; Yurky 239, Johnstone Trail to Shell Beach, TBSP

nisquallensis Sull. * Yurky 237, Audubon Canyon Ranch

Gyrothyra M.A. Howe

underwoodiana M.A. Howe * Yurky 16, Jepson Trail, TBSP

Jungermannia L. emend. Dum.

rubra Gott. *ex* Underw. Howell 682, east of Drake's Bay (CAS & DS); Campbell, Mill Valley (CAS & DS)

Lepidozia (Dum.) Dum.

reptans (L.) Dum. Carter 437, Cataract Gulch (UC); Yurky 67, Wildcat Canyon, STSP

Lophocolea (Dum.) Dum.

bidentata (L.) Dum. * Yurky 71, Cataract Trail near Alpine Lake, MMWD; Yurky 164, Teixeira Trail, PRNS

cuspidata (Nees) Limpr. Howe 27, Olema (Howe 1899); Yurky 52, Cataract Trail near Alpine Lake, MMWD; Yurky 243, T.C.C. Trail, Mt. Tamalpais, MTSP

heterophylla (Schrad.) Dum. Sutliffe, Williams Gulch, Mt. Tamalpais (CAS & DS); Mason 2525, Phoenix Lake (CAS & DS); Yurky 244, T.C.C Trail, MTSP

Lophozia (Dum.) Dum.

excisa (Dicks.) Dum. Campbell, Lake Lagunitas (CAS & DS)

Lunularia Adans.

cruciata (L.) Dum. Sutliffe, Mill Valley (CAS & DS); Thiers 40637, Alpine Lake (SFSU); Yurky 135, Pike County Gulch

Marchantia L.

polymorpha L. Eastwood, Bear Valley (CAS & DS); Sutliffe, Ross Hills (CAS & DS); Yurky 128, Lily Lake, MMWD

Marsupella Dum.

bolanderi (Aust.) Underw. Campbell, Mill Valley (CAS & DS); Howell 465, Lake Lagunitas (CAS & DS); Yurky 129, Shell Beach, TBSP

emarginata (Ehrh.) Dum. (Howe 1896), no locality; Yurky 883, Kehoe Beach, PRNS

Metzgeria Raddi

temperata Kuwah. * Yurky 166, Sky Trail on Mt. Wittenberg, PRNS

Porella L.

bolanderi (Aust.) Pears. Howell 685, San Rafael (CAS & DS); Campbell, Mill Valley (CAS & DS); Yurky 172, near Battery Ledyard, AISP

cordaeana (Hüb.) Moore Wagner 3050, near Muir Woods (UC); Carter 436, Cataract Gulch (UC); Yurky 886, Barnabe Trail, STSP *navicularis* (Lehm. & Lindenb.) Lindb. Sutliffe, Mill Valley (CAS & DS); Mason, Alpine Lake (UC); Yurky 178, Bear Valley Trail, PRNS

roellii Steph. Sutliffe, San Anselmo (CAS & DS); Howell 667, Black Canyon, San Rafael Hills (CAS & DS); Yurky 188, Morser's Gulch, GGNRA

Radula Dum.

bolanderi Gott. Hermann 17503, Muir Woods (CAS & DS); Howell, Sausalito (CAS & DS); Yurky 99, Johnston Trail near Shell Beach, TBSP

complanata (L.) Dum. Sutliffe, Lake Lagunitas (CAS & DS); Hermann 17537, Muir Woods (CAS & DS); Yurky 33, Barnabe Trail, STSP

Riccardia S. Gray

chamedryfolia (With.) Grolle Eastwood, Mill Valley (CAS & DS); Brandegee 10, Bolinas Heights (CAS & DS); Yurky 267, Steep Ravine Trail, MTSP

latifrons Lindb. Howe 1184, Redwood Canyon (Howe 1899)

multifida (L.) S. Gray Sutliffe, Williams Gulch (CAS & DS); Mueller 6933, near Alpine Lake dam (UC); Yurky 13, Bear Valley Trail, PRNS

Riccia L.

austini Steph. Carter 391, near Woodacre (CAS & DS)

beyrichiana Hampe *ex* Lehm. Howell 690, Kentfield Hills (CAS & DS); Mitchell 45, no locality (SFSU)

californica Aust. Sutliffe, Tennessee Valley Rd (CAS & DS); Carter 294, near Fairfax Golf Course (UC); Yurky 274, Heart's Desire Beach, TBSP

campbelliana M.A. Howe Campbell, Mill Valley (CAS & DS); Howell 475, Inverness (CAS & DS); Yurky 23, Rocky Ridge Rd, Bon Tempe Lake, MMWD

cavernosa Hoffm. Howell 551, Lake Lagunitas (CAS & DS) as *R. crystallina* (see Jovet-Ast 1964-1965)

fluitans L. Sutliffe, Lily Lake (CAS & DS); Carter 534, Lily Lake (UC); HDT 39651, Lily Lake (SFSU)

frostii Aust. * Yurky 3, Nicasio reservoir

glauca L. Sutliffe, Jolli Ranch (CAS & DS)

nigrella DC. Howell 689, Kentfield Hills (CAS & DS); Howell 749, Tiburon (CAS & DS)

sorocarpa Bisch. Howell, Ross (CAS & DS); Yurky 282, Azalea Hill Trail near Bon Tempe Lake, MMWD; Yurky 283, Volunteer Canyon

trichocarpa M.A. Howe * Yurky 667, Johnstone Trail, TBSP

Scapania (Dum.) Dum.

americana K. Müll. Howe 21, Mt. Tamalpais (UC); Campbell, Lake Lagunitas (CAS & DS); Yurky 193, Lily Lake, MMWD

bolanderi Aust. Campbell, Mill Valley (CAS & DS); Duran, Alpine Lake (CAS & DS); Yurky 194, Lily Lake, MMWD

umbrosa (Schrad.) Dum. Campbell, Mill Valley (CAS & DS)

Sphaerocarpos Boehmer

texanus Aust. Sutliffe, Fairfax (CAS & DS); Carter 435, Cataract Gulch (UC); Yurky 293, Audubon Canyon Ranch

Targionia L.

hypophylla L. Sutliffe, Ross-Fairfax (CAS & DS); Eliot, Pt. Reyes (UC); Yurky 142, Steep Ravine Trail, MTSP

BRYOPHYTA

Acaulon C. Müll.

muticum (Hedw.) C. Müll. (Koch 1950)

Alsia Sull.

californica (Hook. & Arnott) Sull. HDT 10305, Phoenix Lake (SFSU); Hermann 17465, Muir Woods (UC); Yurky 666, Jepson Trail, TBSP

Amphidium Schimp.

californicum (Hampe *ex* C. Müll.) Broth. Showers 946, Mt. Tamalpais (SFSU); Yurky 348, Sir Francis Drake Blvd near Lagunitas; Yurky 1069, Lucas Valley Rd

Anacolia Schimp.

menziesii (Turn.) Par. Eastwood 100, Lake Lagunitas (CAS & DS); BMT 714, Tiburon (SFSU); Yurky 806, fire road around Mt. Livermore, AISP

Antitrichia Brid.

californica Sull. *in* Lesq. Howell, Black Point (CAS & DS); Yurky 351, Rock Springs, MMWD; Yurky 354, Rifle Picnic Area, MMWD

Atrichum P. Beauv.

selwynii Aust. Bourell, Mt. Tamalpais (CAS & DS); Mueller 6695, near Alpine dam (UC); Yurky 589, Back Ranch Meadows, CCSP

Aulacomnium Schwaegr.

androgynum (Hedw.) Schwaegr. Mueller 6903, near Alpine dam (UC); Yurky 359, Shell Beach Trail, TBSP; Yurky 672, Sir Francis Drake Blvd near Lagunitas

Bartramia Hedw.

stricta Brid. L. P. Bolander, Tiburon (CAS & DS); Sutliffe 52, San Anselmo (CAS & DS); Yurky 361, Ridge Trail near Deer Park, MMWD

Bestia Broth.

longipes (Sull. *ex* Lesq.) Broth. Blasdale, Mill Valley (CAS & DS); Yurky 1068, Bolema Trail, PRNS; Yurky 1073, Back Ranch Meadows, CCSP

Brachythecium Schimp. *in* B.S.G.

albicans (Hedw.) Schimp. *in* B.S.G. * Yurky 1051, Bolinas-Fairfax Rd, MMWD; Yurky 1065, Bayview Trail, PRNS

velutinum (Hedw.) Schimp. *in* B.S.G. Howell H-40, Mt. Tamalpais (CAS & DS); Howell H- 242, Potrero Meadow (CAS & DS); Yurky 363, Volunteer Canyon

Bryum Hedw.

argenteum Hedw. Howell H-42, Mt. Tamalpais (CAS & DS); Howell H-101, Ignacio (CAS & DS); Yurky 808, Richardson Linear Park, Tiburon

canariense Brid. LFK H45, Mt. Tamalpais (CAS & DS); Yurky 370, Northside Trail, MMWD; Yurky 862, Rocky Ridge Trail near Bon Tempe Lake, MMWD

capillare Hedw. Eastwood 69, Mill Valley (CAS & DS); Sutliffe 75, San Anselmo (CAS & DS); Yurky 381, Bear Valley Trail, PRNS

dichotomum Hedw. Eastwood 19, Mt. Tamalpais (CAS & DS); Howell H-113, Inverness (CAS & DS); Yurky 369, China Camp Village, CCSP

lisae De Not. var. *cuspidatum* (Bruch & Schimp. *in* B.S.G.) Marg. K. Mitchell 2, no locality (SFSU)

miniatum Lesq. LFK H-46, Mt. Tamalpais (CAS & DS); Yurky 717, Cataract Trail near Laurel Dell, MMWD

pseudotriquetrum (Hedw.) Gaertn. et al. Howe, Mill Valley (CAS & DS); LFK H199, Tomales (CAS & DS); Yurky 386, Camp Reynolds, AISP

rubens Mitt. * Yurky 388, San Pedro Rd, CCSP

turbinatum (Hedw.) Turn. Eastwood 26, Mt. Tamalpais (CAS & DS)

violaceum Crundw. & Nyh. * Yurky 309, Pike County Gulch

Ceratodon Brid.

purpureus (Hedw.) Brid. Howe, Ross (CAS & DS); Howell H-196, Angel Island (CAS & DS); Yurky 393, China Camp Village, CCSP

Claopodium (Lesq. & James) Ren. & Card.

bolanderi Best (Koch 1950); Yurky 402, Sir Francis Drake Blvd near Lagunitas

crispifolium (Hook.) Ren. & Card. Bolander, no locality (CAS & DS); Yurky 403, Cataract Trail near Alpine Lake, MMWD

whippleanum (Sull. *in* Whipple & Ives) Ren. & Card. Eastwood 92, San Anselmo (CAS & DS); Hermann 17532, Muir Woods (CAS & DS); Yurky 410, Visitor Center, AISP

Coscinodon Spreng.

calyptratus (Hook. *in* Drumm.) C. Jens. *ex* Kindb. (Koch 1950)

Crumia Schof.

latifolia (Kindb. *in* Mac.) Schof. Hermann 17475, Muir Woods (CAS & DS); Yurky 415, Barnabe Trail, STSP; Yurky 416, Fish Gulch Trail near Phoenix Lake, MMWD

Dendroalsia Britt.

abietina (Hook.) Britt. Howe 26, Mill Valley (CAS & DS); Lersten, Muir Woods (UC); Yurky 771, Audubon Canyon Ranch

Desmatodon Brid.

convolutus (Brid.) Grout LFK X74, Bear Valley (CAS & DS)

Dicranella (C. Müll.) Schimp.

heteromalla (Hedw.) Schimp. * Yurky 317, Audubon Canyon Ranch; Yurky 424, Back Ranch Meadows, CCSP; Yurky 842, McCurdy Trail near Dogtown, GGNRA

varia (Hedw.) Schimp. LFK H-256, Mt. Tamalpais (CAS & DS); Tavares 456, Stinson Beach (CAS & DS)

Dicranoweisia Lindb. *ex* Milde

cirrata (Hedw.) Lindb. *ex* Milde Bourell 159, Mt. Tamalpais (CAS & DS); Sutliffe 294, Lake Lagunitas (CAS & DS); Yurky 433, Jepson Trail, TBSP

Dicranum Hedw.

fuscescens Turn. Bourell 158, Mt. Tamalpais (CAS & DS); Yurky 324, Sky Trail, PRNS

scoparium Hedw. * Yurky 323, near Bolinas Ridge Rd at Kent Lake; Yurky 436, Lake Lagunitas, MMWD; Yurky 441, east slope of Mt. Livermore, AISP

tauricum Sapeh. * Yurky 1046, Colier Springs Trail, MMWD; Yurky 1064, Wildcat Canyon Trail, STSP

Didymodon Hedw.

rigidulus Hedw. * Yurky 447, Lagoon Rd, MMWD; Yurky 860, Bootjack Trail, MTSP

tophaceus (Brid.) Lisa LFK H-246, Lake Lagunitas (CAS & DS); LFK H-70, Tiburon (CAS & DS); LFK H-206, Tomales (CAS & DS)

vinealis (Brid.) Zand. var. *vinealis* Howell H-95, Angel Island (CAS & DS); Hermann 17473, Muir Woods (CAS & DS); Yurky 1048, Helen Markt Trail, MMWD

var. *brachyphyllus* (Sull. *in* Whipple & Ives) Zand. * Yurky 325, Shell Beach Trail, TBSP; Yurky 450, Novato Blvd in Novato

var. *flaccidus* (Bruch & Schimp. *in* Schimp.) Zand. Eastwood 99, San Anselmo (CAS & DS); Howell H-194, Angel Island (CAS & DS); Yurky 1059, Steep Ravine Trail, MTSP

Ditrichum Hampe

ambiguum Best LFK H-57, Mt. Tamalpais (CAS & DS); LFK H-313, Inverness (CAS & DS); Hermann 17441, near Olema (UC)

schimperi (Lesq.) Kuntze Eastwood 72, Blithedale (CAS & DS); LFK H-110, Inverness (CAS & DS); Howell H-244, Muir Woods (CAS & DS)

Entosthodon Schwaegr.

attenuatus (Dicks.) Bryhn. (Koch 1950); Howell H-134, Pt. Reyes (CAS & DS)

Epipterygium Lindb.

tozeri (Grev.) Lindb. LFK H-78, Black Point (CAS & DS); Hermann 17483, Muir Woods (CAS & DS); Yurky 452, east slope of Mt. Livermore, AISP

Eucladium Bruch & Schimp *in* B.S.G.

verticillatum (Brid.) Bruch & Schimp. *in* B.S.G. Lersten, Tomales Bay (UC)

Eurhynchium Schimp. *in* B.S.G.

oreganum (Sull.) Jaeg. Howe 73, Olema (CAS & DS); Howell H-264, Laurel Dell (CAS & DS); Yurky 829, Back Ranch Meadows Trail, CCSP *praelongum* (Hedw.) Schimp. *in* B.S.G. Eastwood 186, Pt. Reyes (CAS & DS); Howell H- 218, Mill Valley (CAS & DS); Yurky 520, Steep Ravine Trail, MTSP

pulchellum (Hedw.) Jenn. Hermann 17483, Muir Woods (CAS & DS)

Fissidens Hedw.

bryoides Hedw. Hermann 17539, Muir Woods (CAS & DS); LFK H-79, Black Point (CAS & DS); Yurky 471, East Garrison, AISP

fontanus (B. Pyl.) Steud. Toren 963, Lily Lake (SFSU)

grandifrons Brid. Kellog, Bolinas (CAS & DS); Howell H-271, Cataract Gulch (CAS & DS); Yurky 721, Old RR Grade Trail on Mt. Tamalpais, MMWD

limbatus Sull. (Koch 1950)

milobakeri L. Koch * Yurky 1049, Fish Gulch Trail near Phoenix Lake, MMWD; Yurky 1057, Audubon Canyon Ranch; Yurky 1060, Visitor Center, AISP

pauperculus Howe Howell H-222, Cascade Canyon (CAS & DS); Yurky 785, Dipsea Trail, MTSP; Yurky 795, Barnabe Trail, STSP

Funaria Hedw.

americana Lindb. *in* Sull. (Howe 1896) as *F. muhlenbergii* (see Crundwell and Nyholm 1974); Raven 13, Tiburon (CAS & DS) as *F. muhlenbergii*

hygrometrica Hedw. KM 31, San Anselmo (SFSU); Howell H-73, Tiburon (CAS & DS); Yurky 686, Kent Lake dam, MMWD

Grimmia Hedw.

laevigata (Brid.) Brid. * Yurky 480, Dillon Beach Road

mariniana Sayre LFK H-48, Mt. Tamalpais (CAS & DS); Howell H-184, Mt. Tamalpais (CAS & DS); Yurky 483, Rock Springs Trail, MMWD

montana Bruch. & Schimp. *in* B.S.G. (Koch 1950); Yurky 328, Dipsea Trail, MTSP

pulvinata (Hedw.) Sm. Howell H-245, Lagunitas Meadow (CAS & DS); Yurky 492, Novato Blvd in Novato; Yurky 658, Back Ranch Meadows Trail, CCSP

torquata Hornsch. *in* Grev. Howe, Mill Valley (CAS & DS); Yurky 332, Bootjack Trail, MTSP

trichophylla Grev. Oberlander, Carson Ridge (SFSU); LFK H-221, Mill Valley (CAS & DS); Yurky 495, Olema Valley Trail, PRNS

Hedwigia P. Beauv.

ciliata (Hedw.) P. Beauv. LFK H-50, Mt. Tamalpais (CAS & DS); Yurky 647, Rock Springs Picnic Area, MMWD; Yurky 733, Rocky Ridge Rd near Bon Tempe Lake, MMWD

Homalothecium Schimp. *in* B.S.G.

arenarium (Lesq.) Lawt. Howe, Mill Valley (CAS & DS); Koch 3582, near Black Point (UC); Toren 663, Lily Lake (SFSU)

fulgescens (Mitt. *ex* C. Müll.) Lawt. Lachelt 592, Bolinas Rd (SFSU)

nevadense (Lesq.) Ren. & Card. Howe, Lake Lagunitas (CAS & DS) *nuttallii* (Wils.) Jaeg. Howe 11, Olema (CAS & DS); Eastwood 89, San Anselmo (CAS & DS); Yurky 599, Shell Beach Trail, TBSP

pinnatifidum (Sull. & Lesq.) Lawt. Bourell 160, Mt. Tamalpais (CAS & DS); Howell H-203, Tomales (CAS & DS); Yurky 685, Sir Francis Drake Blvd near Lagunitas

Hygrohypnum Lindb.

bestii (Ren. & Bryhn. *in* Ren.) Broth. Sutliffe 296, Lake Lagunitas (CAS & DS) as *H. molle*

Hypnum Hedw.

circinale Hook. Hermann 17496, Muir Woods (CAS & DS); LFK H278, Cataract Gulch (CAS & DS); Yurky 620, near main campground, STSP

cupressiforme Hedw. (Koch 1950)

subimponens Lesq. Sutliffe 293, Lake Lagunitas (CAS & DS); Foley 8, Lucas Valley Rd (SFSU); Mitchell 10, no locality (SFSU)

Isothecium Brid.

cristatum (Hampe) Robins. Thiers 14898, Alpine Lake (SFSU); Lersten (as *E. britoniae*) Muir Woods (UC); Yurky 512, Visitor Center, AISP

myosuroides Brid. Howe, Mill Valley (CAS & DS); Campbell 8a, Mill Valley (CAS & DS); Yurky 1075, Pantoll Ranger Station, MTSP

Leptodictyum (Schimp.) Warnst.

riparium (Hedw.) Warnst. Toren 993, Lily Lake (SFSU); Yurky 1067, Five Brooks Trailhead, PRNS

Leucolepis Lindb.

acanthoneuron (Schwaegr.) Lindb. Smith, Nicasio (CAS & DS); Thiers 40641, Alpine Lake (SFSU); Yurky 812, along Lagunitas Creek, STSP

Metaneckera Steere

menziesii (Hook. *in* Drumm.) Steere Howe 45, no locality (CAS & DS); Sutliffe 5, Mt. Tamalpais (CAS & DS)

Neckera Hedw.

douglasii Hook. Hermann 17545, Muir Woods (CAS & DS); Howell H-247, Potrero Meadow (CAS & DS); Yurky 637, Northside Trail, MMWD

Orthodontium Schwaegr.

gracile (Wils. *in* Sm. & Sowerby) Schwaegr. *ex* B.S.G. Hermann 17497, Muir Woods (CAS & DS)

Orthotrichum Hedw.

affine Brid. * Yurky 656, Bolinas-Fairfax Rd, MMWD; Yurky 828, Back Ranch Meadows Trail, CCSP

bolanderi Sull. Howell H-250, Bootjack (CAS & DS)

consimile Mitt. (Koch 1950); Hermann 17474, Muir Woods (CAS & DS)

lyellii Hook. & Tayl. Howe, Olema (CAS & DS); Campbell 5a, Mill Valley (CAS & DS); Yurky 531, Shell Beach Trail, TBSP *rupestre* Schleich. *ex* Schwaegr. Howell H-250a, Bootjack (CAS & DS); Howell H-266, Laurel Dell (CAS & DS); Yurky 533, Rifle Picnic Area, MMWD

tenellum Bruch *ex* Brid. Howell H-88, Black Point (CAS & DS); H-236, Mt. Tamalpais (CAS & DS); Campbell 2a, Mill Valley (CAS & DS)

Philonotis Brid.

capillaris Lindb. *in* Hartm. Eastwood 104, Lake Lagunitas (CAS & DS); Howell H-134, Inverness (CAS & DS)

fontana (Hedw.) Brid. Eastwood 94a, San Anselmo (CAS & DS); Eastwood 190, Pt. Reyes (CAS & DS); Howell H-143, Mt. Tamalpais (CAS & DS)

muhlenbergii (Schwaegr.) Brid. * Yurky 534, Olema Valley Trail, PRNS; Yurky 735, Rocky Ridge Rd near Bon Tempe Lake, MMWD; Yurky 823, Pt. Reyes-Petaluma Rd

Physcomitrium (Brid.) Brid.

pyriforme (Hedw.) Hampe Eastwood 105, Lake Lagunitas (CAS & DS). Excluded from California by Britton (1898) and subsequently by Koch (1950), but *Physcomitrium megalocarpum* Kindb. and var. *californicum* (Britt.) Grout as cited by Koch are present in California and are now synonymous with *P. pyriforme* in Anderson et al. (1990).

Plagiomnium T. Kop.

insigne (Mitt.) T. Kop. Howe 60, near Olema (UC); Greene 60, Olema (CAS & DS); Yurky 800, junction of Bear Valley and Meadow Trails, PRNS

Plagiothecium Schimp. *in* B.S.G.

denticulatum (Hedw.) Schimp. *in* B.S.G. (Koch 1950)

Pleuridium Rabenh.

acuminatum Lindb. Howe 37, Drake's Bay (CAS & DS); Howell H-49, Mt.Tamalpais (CAS & DS)

subulatum (Hedw.) Rabenh. Howell, San Rafael (CAS & DS); Yurky 539, Jepson Trail, TBSP; Yurky 703, Northridge Trail, AISP

Pohlia Hedw.

cruda (Hedw.) Lindb. Lersten, Tomales Bay (UC)

longibracteata Broth. *in* Röll. Toren 315, north of Mt. Tamalpais (SFSU); Yurky 1074, Kehoe Beach

nutans (Hedw.) Lindb. Eastwood 184, Pt. Reyes (CAS & DS)

Polytrichum Hedw.

juniperinum Hedw. Eastwood 107, Lake Lagunitas (CAS & DS); Jepson, Olema (CAS & DS); Yurky 676, McCurdy Trail near Dogtown, GGNRA

piliferum Hedw. * Yurky 541, Azalea Hill Trail, MMWD

Porotrichum (Brid.) Hampe

bigelovii (Sull.) Kindb. Hermann 17486, Muir Woods (CAS & DS); Eastwood, Lake Lagunitas (CAS & DS); Yurky 608, Bear Valley Trail, PRNS

vancouveriense (Kindb. *in* Mac.) Crum Koch 3342, Olema (CAS & DS); Hermann

17552, Muir Woods (UC); Yurky 1055, Volunteer Canyon

Pseudobraunia (Lesq. & James) Broth.

californica (Lesq.) Broth. Hermann 17469, Rock Springs (UC); Yurky 547, Fern Creek Trail, MMWD; Yurky 742, Kent Trail near Alpine Lake, MMWD

Pseudotaxiphyllum Iwats.

elegans (Brid.) Iwats. (Koch 1950); Yurky 802, junction of Sky Trail and Meadow Trail, PRNS

Pterogonium Sm.

gracile (Hedw.) Sm. Howe 12, Olema (CAS & DS); Eastwood, San Anselmo (CAS & DS); Thiers 14897, Alpine Lake (SFSU)

Ptychomitrium Fürnr.

gardneri Lesq. Howell H-103, Ignacio (CAS & DS)

Racomitrium Brid.

canescens (Hedw.) Brid. Foley 20, Lucas Valley Rd (SFSU); Thiers 40640, Alpine Lake (SFSU)

occidentale (Ren. & Card.) Ren. & Card. Howe, Lake Lagunitas (CAS & DS); Yurky 606, Ridge Trail near Five Brooks, PRNS

varium (Mitt.) Jaeg. West, no locality (SFSU)

Scleropodium Schimp. *in* B.S.G.

californica (Lesq.) Kindb. Howell H-193, Angel Island (CAS & DS); Yurky 549, Lalgunitas- Rock Springs Rd near Lake Lagunitas, MMWD; Yurky 550, Volunteer Canyon

cespitans (C. Müll.) L. Koch Campbell 4a, Mill Valley (CAS & DS); Yurky 552, Bolinas-Fairfax Rd, MMWD; Yurky 872, San Pedro Rd, CCSP

obtusifolium (Jaeg.) Kindb. *in* Mac. & Kindb. Eastwood 93, San Anselmo (CAS & DS); Hermann 17468, Muir Woods (CAS & DS); Yurky 836, Sir Francis Drake Blvd near Lagunitas

touretii (Brid.) L. Koch var. *touretii* Howell H-220, Mill Valley (CAS & DS); Yurky 602, Back Ranch Meadows Trail, CCSP; Yurky 718, Cataract Trail near Laurel Dell, MMWD

var. *colpophyllum* (Sull.) Lawt. *ex* Crum Eastwood 40, Mt. Tamalpais (CAS & DS); Hermann 17509, Muir Woods (CAS & DS); Yurky 693, Kent Lake dam, MMWD

Scouleria Hook. *in* Drumm.

aquatica Hook. *in* Drumm. Howell H-262, Mt. Tamalpais (CAS & DS)

Timmiella (De Not.) Limpr.

crassinervis (Hampe) L. Koch Thiers 10304, Phoenix Lake (SFSU); Yurky 342, Richardson Linear Park, Tiburon; Yurky 559, Perimeter Rd near North Garrison, AISP

Tortula Hedw.

amplexa (Lesq.) Steere Howell H-195, Angel Island (CAS & DS) *bolanderi* (Lesq.) Howe (Howe 1897); Howell H-98, Ignacio (CAS & DS)

muralis Hedw. Howell H-198, Angel Island (CAS & DS); Yurky 343, Pike County Gulch; Yurky 569, Novato Blvd in Novato

pagorum (Milde) De Not. Howell H-76, Black Point (CAS & DS)

princeps De Not. Sutliffe 45, Ross (CAS & DS); Eastwood 106, Lake Lagunitas (CAS & DS); Yurky 575, Pantoll Ranger Station, MTSP

ruralis (Hedw.) Gaertn. et al. Sutliffe, Ross (CAS & DS); Yurky 581, Temelpa Trail, MMWD; Yurky 832, Miwok Trail, CCSP

stanfordensis Steere * Yurky 583, Pike County Gulch; Yurky 584, Volunteer Canyon

Triquetrella C. Müll.

californica (Lesq.) Grout (Koch 1950)

Weissia Hedw.

controversa Hedw. Eastwood 73, Mill Valley (CAS & DS); Mueller 6951, near Alpine Lake dam (UC); Yurky 586, Eldridge Grade Trail, MMWD

Excluded Taxa

Phaeoceros laevis ssp. *laevis*: based on misidentifications (Proskauer 1957); only one locality in North America (Schuster 1992)

Fossombronia pusilla: based on misidentifications (Evans 1923)

Scapania nemorosa: based on misidentification (Evans 1923)

Funaria muhlenbergii: misnamed based on taxonomic confusion (Crundwell and Nyholm 1974)

Orthotrichum pulchellum: not found in central California (Vitt 1973)

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The systematics of the genus *Drepanocladus* (C. Müll.) G. Roth s. l.

R. N. Shlyakov[1]

Abstract: *We confirm previous statements that it is necessary to remove the genera* Warnstorfia *and* Loeskypnum *from* Drepanocladus *s. lat. and transfer them to the subfamily Calliergoideae. The genera* Sanionia *and* Drepanocladus *s. str. remain in the subfamily Drepanocladoideae. Some species of* Drepanocladus *s. lat. have been referred to the genus* Scorpidium, *but this is erroneous.*

Species of the genus *Drepanocladus* in the traditional sense (the sense of Smirnova, in Abramova et al. 1961, pp. 576-611) play a major role in vegetation: they appear as dominants or codominants in the surface cover of many bog communities, from eutrophic to almost oligotrophic, and are also dominant in a series of boggy meadow, forest and tundra cenozes. However, the systematics of the genus is by no means considered convincingly worked out.

Various authors have given very different numbers of species for the same or similar territories. Thus, Z. N. Smirnova (Abramova et al., 1961) for the Arctic, and essentially for all the territory of the continental part of the Soviet Union, cited 13 species for the genus [later (1962) she increased this figure to 15, distinguishing *D. schulzei* (Limpr.) Loeske and *D. tundrae* (H. Arnell) Loeske as separate species], while in the work of Tuomikoski and Koponen (1979) 20 species are given, excluding those not found in northern Eurasia. An intermediate position is taken by the authors of the checklist of the mosses of Europe and the Azores (Corley et al. 1981).

The main differences among these authors relate to the systematics at the generic level. This article is mainly concerned with these problems. The fundamental question which must be decided in regard to *Drepanocladus* is, is it a genus or a group of genera?

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[1] Translated from Russian by Alan T. Whittemore, Missouri Botanical Garden, St. Louis, MO 63166 USA. The original paper appeared in I. I. Abramova (ed.). 1989. Problemi bryologyy v SSSR: Sbornyk nauchnikh trudof. Nauka, Leningrad. The translator would like to thank Sergei Mosyakin, D. L. Richardson, and Armen Takhtajan for help with the translation.

This is reflected in particular in the monographic study of the genus by Z. N. Smirnova (1954a, 1954b) and in the list of the mosses of Europe and the Azores (Corley et al. 1981). Nevertheless, Loeske (1907) considered that it is a heterogeneous group, defined by ecologically adaptive characters ("biologically heterogeneous genus"), which he divided into four genera: *Sanionia* Loeske, *Limprichtia* Loeske, *Warnstorfia* Loeske and *Drepanocladus* s. str. In a supplement to Loeske, Paul (1916, 1924) also created the genus *Loeskypnum* Paul with a single species, *L. badium* (Hartm.) Paul. Unfortunately, the views of Loeske were not widely considered. The main reason, probably, is that his evidence was considered insufficient. Only a few botanists [in our country, in particular A. S. Lazarenko (1951, 1955) and V. M. Melhichuk (1970)] have maintained the genus *Sanionia* with the species *Sanionia uncinata* (Hedw.) Loeske. The genera *Sanionia* and *Loeskypnum* were accepted by Kanda (1976) in a monographic study of the family Amblystegiaceae in Japan.

In the past decade the point of view of Loeske has been maintained by Tuomikoski. The most important publication on this topic was Tuomikoski and Koponen (1979), based on an unpublished 1958 manuscript of Tuomikoski, supplemented with contemporary studies by Koponen. Tuomikoski considers that the fundamental divisions in the *Calliergon - Drepanocladus* complex in the traditional sense do not pass between these two genera, but separate both genera into two groups.

The first group consists of the genera *Warnstorfia* [*Drepanocladus* sect. *Warnstorfia* (Loeske) Broth. = *D.* sect. *Exannulatus* (Sanio) Z. Smirn., i.e. *D. exannulatus* (B.S.G.) Warnst., *D. fluitans* (Hedw.) Warnst. and related species], *Loeskypnum* [*Drepanocladus* sect. *Pseudodrepanocladus* Broth. = *D.* sect. *Curvifolius* Z. Smirn., i.e. *D. badius* (Hartm.) G. Roth] and related to them "*Calliergon wickesii* Grout", and also the greater part of the species in the genus *Calliergon* (Sull.) Kindb.

The second group consists of the species of the remaining sections of the collective genus *Drepanocladus*, and also the genus *Scorpidium* (Schimp.) Limpr. emend. Paul.

Having analyzed the characters of various species of the complex, Tuomikoski recognized 6 groups of characters by which the groups of taxa may be distinguished. Two of these characters are seldom used: branching, and the distribution ("topography") of rhizoids on the stem. The characters of the species of both groups are compared below:

Character	*Warnstorfia-Calliergon*	*Drepanocladus - Scorpidium*
	Branching Not strongly distichous and sometimes entirely radial	Never radial, but more or less distichous
Rhizoids	Leaves of all species with cells suitable for forming rhizoids (initial cells, or nematogens); if rhizoids are formed from cells of the stem epidermis, then these are not clustered by the place of attachment of the leaf costa.	Leaves devoid of rhizoids and initial cells; rhizoids, if present, restricted to areas of the stem immediately below the leaf insertions.
Perichaetial leaves (after Limpricht)	Not plicate.	More or less plicate.
Vaginulum	Paraphyses none or very sparse.	Always with paraphyses.
Annulus	Absent or weakly differentiated.	Always differentiated and usually consisting of 2-3 rows of cells.
Peristome tooth structure	Usually with a few step-shaped unequal edges.	With smooth, not step-shaped and not serrate margins (except *Drepanocladus uncinatus*, which also differs from the other species in other respects).

Based on Tuomikoski's conclusions, Koponen (1979, p. 224) altered the delimitations of the subfamilies *Calliergonoideae* Kanda and *Drepanocladioideae* Kanda, which had been described by Kanda (1975) together with the other subfamilies *Amblystegioideae* Kanda, *Campylioideae* Kanda and *Hygrohypnoideae* Kanda. It is logical that Koponen understood the subfamily *Calliergoideae* in the sense of the *Warnstorfia - Calliergon* group. This stands for the exclusion from the subfamily, not only of *Pleurozium* Mitt. and *Calliergonella* Loeske, but also the genus *Scorpidium* (cf. Kanda 1976, p. 80).

It may seem that this work provides convincing evidence for abandoning the treatment of the genus *Drepanocladus* in the traditional sense as a natural group. Therefore, we accepted the thesis of the Tuomikoski and Koponen system of the *Calliergon - Drepanocladus* complex in the "Conspectus of the bryophyte flora of the Murmansk oblast" (Shlyakov and Konstantinova 1982). However, in the checklist of the mosses of Europe and the Azores (Corley et al. 1981), which was published and surely definitively formulated after the publication of the work of Tuomikoski and Koponen, not only is the traditional treatment of the genus *Drepanocladus* maintained, but

Drepanocladus and *Calliergon* are separated by two genera in the list. It is true that in a footnote to the genus *Drepanocladus* (p. 655) the authors of the list acknowledge that it is necessary to reexamine the generic boundaries in the order *Hypnobryales*; nonetheless they do not account for the transfers of Tuomikoski and Koponen.

For this reason, we decided to critically investigate "the conduct" of the above-indicated characters for the species of this interesting group. The results of this study and their interpretations are given below.

Regarding the characters of the branching of the stems, we can affirm that many-sided radial branching is seen only in the species of *Calliergon* and *Drepanocladus* sect. *Warnstorfia*. *Drepanocladus badius* is usually weakly branched, but in rare vigorous plants with abundant branching it is characteristically distichous. However, this does not refute the results of Tuomikoski, insofar as he did not consider this character to be one of the most trustworthy for delimitation of the groups (Tuomikoski and Koponen 1979, p. 217). In the remaining species of the complex, if the branching is well developed, then it is distichous.

All species of the *Warnstorfia - Calliergon* group, except for *C. trifarium* (Web. et Mohr) Kindb., removed by Paul (1924) to the genus *Scorpidium*, are characterized by rhizoid-initial cells on the upper parts of the leaves, which in *D. fluitans* and *C. stramineum* (Brid.) Kindb. rarely produce rhizoids. In species of sections *Sanionia* (Loeske) Broth. [*Uncinatus* (Warnst.) Z. Smirn.], *Vernicosus* (G. Roth) Z. Smirn., *Turgidus* Z. Smirn. and *Drepanocladus* they are absent.

As for the position of rhizoids on the stem, this character is not easy to investigate, since the rhizoids of species of *Drepanocladus* in the broad sense and *Calliergon* occur rarely, seemingly only on parts of the stem that contact the mineral substrate, and even then not always. We have succeeded in finding rhizoids on plants of only 4 species: *Calliergon cordifolium* (Hedw.) Kindb., *Drepanocladus fluitans*, *D. revolvens* (Sw.) Warnst. and *D. aduncus* (Hedw.) Warnst. In these species there are 2 types of rhizoid insertion: 1 - dispersed, from various points on a segment of the stem, and 2 - in fascicles by the base of the costa of the leaf. The first type is found in representatives of the *Warnstorfia - Calliergon* group: *C. cordifolium* (fig. 1: 1) and *Drepanocladus fluitans* (fig. 1: 2). The second type is noted in species of the *Drepanocladus - Scorpidium* group: *D. revolvens* (fig. 1: 3, 4) and *D. aduncus* (fig. 1: 5), which affirms the data of Tuomikoski.

For the structure and also the shape of the perichaetial leaves, again we may recognize two types: 1 - smooth, not plicate, in the upper part more or less abruptly narrowed to a short acumen or a blunt apex, and 2 - clearly plicate, or rarely almost smooth, more gradually narrowed to a slender acumen. The first type is characteristic of species of the *Warnstorfia - Calliergon* group (fig. 2: 1-4; compare also Nyholm 1965 fig. 270-272, 274, 282, 285-90), the second of species of the remaining sections of the genus *Drepanocladus* (fig. 2: 5, 6; compare also Nyholm 1965 fig. 275, 276, 281).

The absence of an annulus is characteristic of the genus *Calliergon* and species of *Drepanocladus* sect. *Warnstorfia.* We were not able to find one in the single sporangium of *D. badius* available to us, although according to data in the literature (Limpricht 1898, Smirnova 1954b, 1962) this species has an annulus. But unlike the remaining species, in which it is broad, usually of 2-3 rows of cells, the annulus of *D. badius* is characteristically narrow (Smirnova 1954b). We are not excluding the possiblities that in this species the annulus may be present or absent. To be certain of this it is necessary to examine supplementary material. But even so the annulus is narrow, suggesting that it is best to distinguish *D. badius* in this regard from the remaining species of *Drepanocladus*, which have broad annuli.

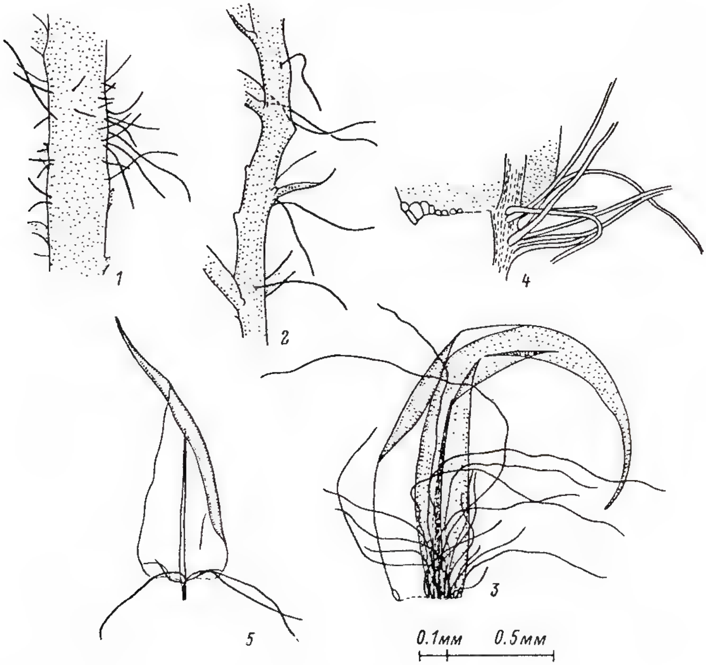

Figure 1. Characters of the origin of rhizoids from the stem.

The presence or absence of paraphyses on the vaginulum, and also the character of the edge of the teeth of the outer peristome Tuomikoski and Koponen (1979, p. 217) justly did not consider to be among the most trustworthy characters for discriminating between the two groups: on the one hand, the vaginulum may have a small quantity of paraphyses in species of the *Warnstorfia - Calliergon* group, and on the other, Limpricht (1898) indicated a small number of paraphyses for *Drepanocladus sendtneri* (Schimp. ex H. Müll.) Warnst. The peristome teeth of *D. uncinatus* (Hedw.) Warnst., according to Tuomikoski, are similar to the teeth of species of the *Warnstorfia - Calliergon* group. Therefore we will not discuss these characters in detail.

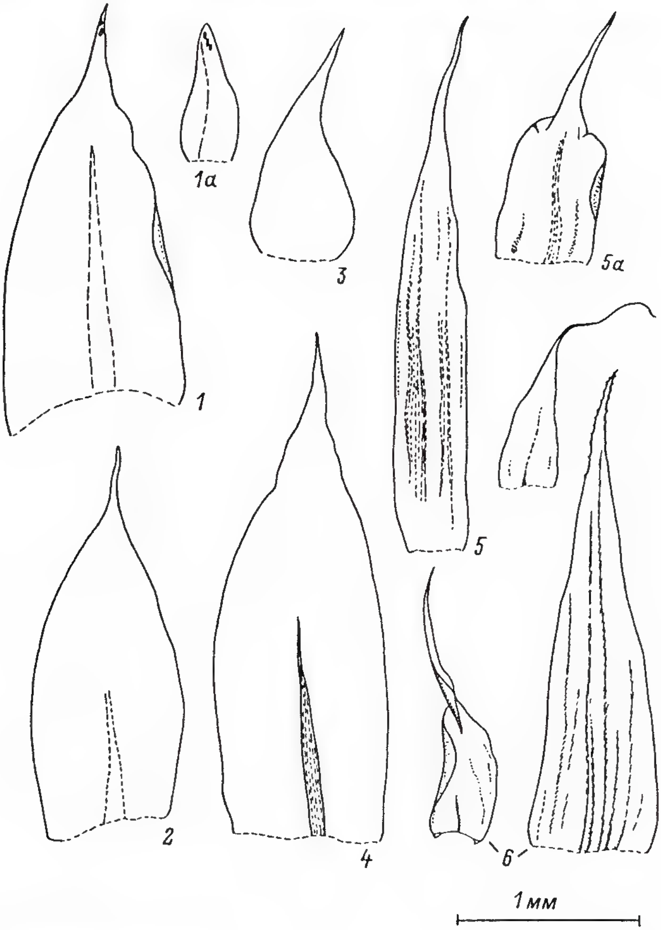

Figure 2. Perichaetial leaves.

However, besides the characters above, we have succeeded in finding one more that distinguishes the 2 groups: the form of the cross-section of the stem. Species of the *Warnstorfia - Calliergon* group are characterized by a round-pentagonal or round section, while in the remaining species of *Drepanocladus* the section is elliptical (cf.: figures 3: 1-4 and 5-7). The form of the stem section is probably correlated with the type of branching: the first type corresponding with many-sided or very sparse branching, the second with distichous branching. Nevertheless, this correlation is not perfect: plants of the second group with almost unbranched stems, in particular in *D. lycopodioides* (Brid.) Warnst. (see fig. 3: 7) and *D. lapponicus* (Norrl.) Z. Smirn., are nonetheless elliptical in section.

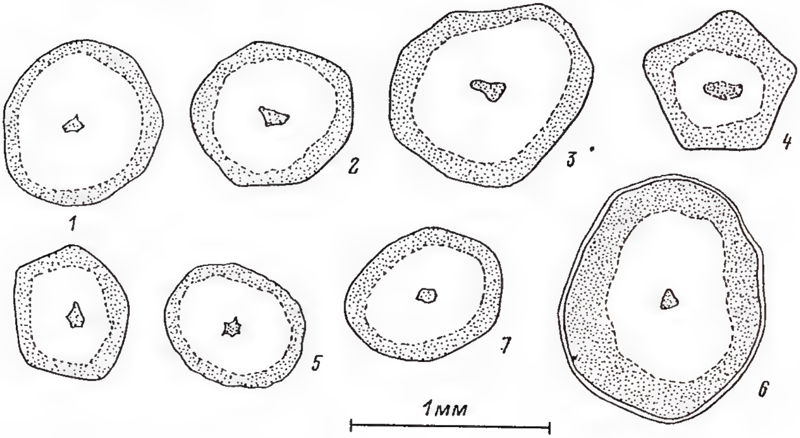

Figure 3. Cross sections of the stem.

It can hardly be considered chance that this group of species attributed to the genus *Drepanocladus* share a much larger group of characters with species of *Calliergon* than with the remaining species of the genus. Therefore we consider that we are fully justified in dividing the traditional genus and ascribing the species of the sections *Warnstorfia* and *Pseudodrepanocladus* to the subfamily Calliergonoideae. From this it unavoidably follows that these sections must be treated as separate genera. Thus, only the species of the sections attributed by Tuomikoski and Koponen to the *Drepanocladus - Scorpidium* group remain within the boundaries of the subfamily Drepanocladoideae.

For these, we are completely in agreement with the authors of the checklist of mosses of Europe and the Azores (Corley et al. 1981), that *Drepanocladus lycopodioides* and *D. vernicosus* (Mitt.) Warnst., and also *D. latifolius* (Lindb. & H. Arn.) Warnst. and *D. lapponicus,* cannot be assigned to the genus *Scorpidium*. This is supported, in part, by the form of the stem sections: in all these species of *Drepanocladus* the sections are broadly elliptical (see fig. 3: 7; Abramova et al. 1961, fig. 227, 228; Nyholm 1965 fig. 277), whereas in species of *Scorpidium* (Nyholm 1965 fig. 283, 284), and also in *Calliergon trifarium* [*Scorpidium trifarium* (Web. & Mohr) Paul] they are circular. We are not sure in general that *Scorpidium* should be placed in the subfamily *Drepanocladoideae*, or even the *Calliergoideae*. In our opinion, it is more likely that it belongs in the *Hygrohypnoideae*. However, without more detailed study we refrain from a decision at this time.

Of the species put in subf. *Drepanocladoideae*, the separation of *D. uncinatus* in the separate genus *Sanionia*, in agreement with A. A. Lazarenko (1951, 1955), V. M. Mel'nichuk (1970) and Kanda (1976) is entirely justified. However, as for the remaining species, we consider it best to keep them in a single genus *Drepanocladus* divided into two subgenera - *Drepanocladus* and *Limprichtia* (Loeske) Podp. The second subgenus is divided into sections following Z. N. Smirnova (1962). Within the supraspecific taxa, we list the species or groups of species that occur in the territory of the USSR. We refrain from giving a precise species-level taxonomy until the taxonomic validity of a series of disputed species has been established.

Thus, we present the following taxonomy of the collective genus *Drepanocladus*:

Subfamily *Calliergonoideae* Kanda, 1977, emend. T. Kop. 1979.
    Genus *Warnstorfia* Loeske [*W. exannulata* (B.S.G.) Loeske, *W. fluitans* (Hedw.) Loeske and related species]
    Genus *Loeskypnum* Paul [*L. badium* (Hartm.) Paul]

Subfamily *Drepanocladoideae* Kanda, 1977, emend. T. Kop., 1979.
    Genus *Sanionia* Loeske [*S. uncinata* (Hedw.) Loeske]
    Genus *Drepanocladus* (C. Müll.) G. Roth
        subgenus *Drepanocladus* [*D. aduncus* (Hedw.) Warnst., *D. sendtneri* (Schimp.ex H. Müll.) Warnst. and related species]
        subgenus *Limprichtia* (Loeske) Podp. emend. Schljak.
            section *Limprichtia* [*D. revolvens* (Sw.) Warnst. and *D. intermedius* (Lindb.) Warnst.]
            section *Vernicosus* (G. Roth) Z. Smirn. [*D. vernicosus* (Mitt.) Warnst. and *D. lapponicus* (Norrl.) Z. Smirn.]
            section *Turgidus* (Debat) Z. Smirn. [*D. lycopodioides* (Brid.) Warnst. and *D. latifolius* (Lindb. et H. Arn.) Warnst.]

We consider that the subgenus *Limprichtia* could plausibly be recognized as a separate genus, or alternatively lowered to the rank of a section. However, to treat the genera in the sense of Tuomikoski and Koponen would demand the creation of a separate genus for the species of *Drepanocladus* included by Tuomikoski in the genus *Scorpidium*, which is not sufficiently justified.

In conclusion I would like to thank A. V. Dombrovskaya for the illustrations.

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Mosses from the State of Maine - VII.

Bruce Allen[1]

This is the seventh paper in the series *Mosses from the State of Maine*, a project to document, at the county level, the Maine moss flora. There are twelve mosses in this paper that did not appear in the latest Checklist of Maine Mosses (Allen 1994): *Ephemerum spinulosum* Bruch & Schimp. in Schimp., *D. schreberiana* (Hedw.) Hilf. ex Crum & Anders. var. *robusta* (Schimp. ex Braithw.) Crum & Anders., *Fissidens fontanus* (B. Pyl.) Steud., *Haplocladium microphyllum* (Hedw.) Broth., *Sphagnum affine* Ren. & Card., *S. angustifolium* (C. Jens. ex Russ.) C. Jens. in Tolf, *S. centrale* C. Jens. in Arnell & C. Jens., *S. subtile* (Russ.) Warnst., *Splachnum rubrum* Hedw., *Tetraphis geniculata* Girg. ex Milde, *Tetrodontium ovatum* and *Tortula papillosa* Wils. in Spruce. The record of *Philonotis muehlenbergii* from Hancock County (Patterson 1930), has been redetermined as *P. fontana* (Zales 1973). The record of *Bryum muehlenbeckii* from Oxford County (Parlin 1939) is based upon a misdetermination of *Bryum pseudotriquetrum*. The record of *Pohlia proligera* from Cumberland County (Pitman 1930), actually represents *P. annotina*. *Mielichhoferia mielichhoferiana* is excluded from the Maine moss flora.

The nomenclature and taxonomic concepts of the species in this list follow Anderson et al. (1990) with the exception of *Sphagnum* which follows Anderson (1990). Unless otherwise noted these collections are deposited at MO. Collections made by B. Allen are listed only by collection number.

AMBLYSTEGIACEAE

Amblystegium serpens - **Aroostook**: 16376; **Lincoln**: 14572.
A. varium - **Aroostook**: 16359; **Cumberland**: 15942.
Calliergon cordifolium - **Aroostook**: 16309.
C. stramineum - **Franklin**: 15861; **Oxford**: Holmes 61; **Washington**: Holmes 133.
Campylium chrysophyllum - **Androscoggin**: 14740B; **Aroostook**: 16375; **Lincoln**: 16641; **Washington**: Holmes 330.
C. hispidulum - **Aroostook**: 16387; **Kennebec**: 14778.
C. radicale - **Kennebec**: 14750.
Drepanocladus aduncus - **Aroostook**: 16299.
Hygroamblystegium fluviatile - **Aroostook**: 16372; **Penobscot**: 16496.
H. tenax - **Androscoggin**: 14679; **Aroostook**: 16358; **Knox**: 15793.
Hygrohypnum eugyrium - **Knox**: 14637; **Oxford**: 16741; **Penobscot**: 16527.

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H. ochraceum - **Knox**: 14618; **Washington**: 16276.

Leptodictyum humile - **Piscataquis**: 16561.

L. riparium - **Aroostook**: 16303; **Penobscot**: 16523.

Scorpidium scorpioides - **Aroostook**: Riddle.

Warnstorfia fluitans - **Androscoggin**: 14743; **Aroostook**: 16368; **Cumberland**: 15900; **Franklin**: 15836; **Kennebec**: 15705A; **Penobscot**: 16539; **Piscataquis**: 16551.

ANDREAEACEAE

Andreaea rothii - **Franklin**: 15834; **Oxford**: 16662; **Sagadahoc**: 15783; **Washington**: 16284.

A. rupestris - **Penobscot**: 16498A; **Sagadahoc**: 16595.

ANOMODONTACEAE

Anomodon attenuatus - **Androscoggin**: 14739; **Aroostook**: 16363; **Cumberland**: 15914; **Hancock**: Pedano 497; **Penobscot**: 16501.

A. minor - **Penobscot**: Merrill 126.

A. rostratus - **Androscoggin**: Merrill 103; **Penobscot**: Merrill 116.

A. rugelii - **Aroostook**: 16469; **Franklin**: 15806.

AULACOMNIACEAE

Aulacomnium androgynum - **Sagadahoc**: 15768.

A. palustre - **Franklin**: 15823; **Hancock**: Holmes 79; **Kennebec**: 14764; **Knox**: 14615; **Oxford**: 16651.

BARTRAMIACEAE

Bartramia pomiformis - **Aroostook**: 16457; **Oxford**: 16756; **Sagadahoc**: 16592.

Philonotis fontana - **Androscoggin**: 14672; **Oxford**: Adams (MAINE); **Penobscot**: 16494.

! *Philonotis muehlenbergii* was reported from Hancock County by Patterson (1930), this specimen has been redetermined as P. fontana (Zales 1973).

BRACHYTHECIACEAE

Brachythecium acuminatum - **Cumberland**: 15909; **Kennebec**: 15740.

B. campestre - **Aroostook**: 16479; **Lincoln**: 9237.

B. oedipodium - **Aroostook**: 16452; **Kennebec**: 14774; **Oxford**: 16740.

B. oxycladon - **Aroostook**: 16314.

B. plumosum - **Androscoggin**: 14709; **Aroostook**: 16402; **Knox**: 14624; **Piscataquis**: 16582.

B. populeum - **Aroostook**: 16403.

B. reflexum - **Aroostook**: 16391; **Knox**: 15789; **Penobscot**: 16526; **Sagadahoc**: 16616.

B. rivulare - **Aroostook**: 16384; **Kennebec**: 14754; **Knox**: 14619; **Lincoln**: Solomon 20156; **Piscataquis**: 16586; **Washington**: 16278.

B. rutabulum - **Aroostook**: 16302; **Hancock**: Magill 11792; **Oxford**: 16714.

B. salebrosum - **Aroostook**: 16477; **Sagadahoc**: 16608.

B. velutinum - **Aroostook**: 16335; **Kennebec**: 15732; **Penobscot**: 16529; **Oxford**: 16670; **Sagadahoc**: 16611.

Bryhnia novae-angliae - **Androscoggin**: 14737; **Aroostook**: 16397; **Knox**: 14610; **Penobscot**: 16525; **Sagadahoc**: Holmes 37.

Eurhynchium pulchellum - **Aroostook**: 16339; **Knox**: 14617.

Platyhypnidium riparium - **Aroostook**: 16409.

Steerecleus serratus - **Knox**: 15786.

BRYACEAE

Anomobryum julaceum - **Oxford**: Adams (MAINE).

Bryum caespiticum - **Lincoln**: 16645.

B. capillare - **Penobscot**: 16518.

B. dichotomum - **Piscataquis**: 16562; **Washington**: 16267.

! *B. muehlenbeckii* - Reported from Oxford county by Parlin (1939), the collection on which the report was based is Bryum pseudotriquetrum.

Leptobryum pyriforme - **Androscoggin**: 14698; **Cumberland**: Lowe (MAINE); **Franklin**: Lowe (MAINE); **Kennebec**: Carlson (MAINE); **Knox**: Crockett (MAINE); **Oxford**: Lowe (MAINE); **Piscataquis**: Hodgkins (MAINE).

Mielichhoferia elongata - **Oxford**: 16681A.

! *M. mielichhoferiana*. This species was reported in Maine from Piscataquis county by Kennedy and Collins (1901) and from Oxford county by Andrews (1940). The Oxford county specimen (Roxbury Notch, Parlin, MAINE) is *M. elongata* (see Shaw & Schneier 1995). The Piscataquis collection was favorably compared by Kennedy (Collins 1901) to Austin's Musci Appal. Suppl. I, No. 509, *M. compacta*. which according to Shaw and Crum (1984) is an especially robust expression of *Pohlia nutans*.

Pohlia annotina - **Androscoggin**: 14716; **Aroostook**: 16440; **Cumberland**: Lowe (MAINE); **Lincoln**: 15747; **Piscataquis**: Harvey (MAINE); **Washington**: 16268.

P. bulbifera - **Franklin**: Miller 1580 (in NYS, pers. comm. A. J. Shaw); **Washington**: 16273.

P. cruda - **Franklin**: 15856; **Oxford**: 16663; **Penobscot**: 16544.

P. elongata - **Franklin**: 15822.

P. lescuriana - **Kennebec**: 14796; **Lincoln**: 16254; **Piscataquis**: 16555.

P. nutans - **Androscoggin**: 14655; **Aroostook**: 16327; **Cumberland**: Norton (MAINE); **Penobscot**: Ogden & Curtis 2514 (MAINE); **Washington**: Holmes 285.

P. proligera - **Lincoln**: 16251B; **Oxford**: Lowe (MAINE). This species was reported from Cumberland County (Pitman 1930), but the collection on which the report was based (in MAINE) is P. annotina.

P. wahlenbergii - **Aroostook**: Collins; **Oxford**: Lowe (MAINE); **Washington**: Holmes 147.

Rhodobryum ontariense - **Androscoggin**: Parlin (MAINE); **Cumberland**: Lowe

(MAINE); **Kennebec**: Soule (MAINE); **Hancock**: Merrill (MAINE).

BUXBAUMIACEAE

Buxbaumia aphylla - **Aroostook**: 16484.

Diphyscium foliosum - **Androscoggin**: 14659; **Cumberland**: 15939; **Knox**: 14633; **Oxford**: 16657; **Penobscot**: 16503; **Sagadahoc**: 14588.

CLIMACIACEAE

Climacium dendroides - **Kennebec**: 14780; **Lincoln**: Solomon 20122; **Piscataquis**: 16578.

DICRANACEAE

Cynodontium alpestre - **Franklin**: 15865.

Dichodontium pellucidum - **Androscoggin**: 14694; **Aroostook**: 16361; **Knox**: 14623.

Dicranella cerviculata - **Androscoggin**: 14718; **Washington**: Holmes 136.

D. heteromalla - **Androscoggin**: 14702; **Aroostook**: 16478; **Sagadahoc**: 14592.

D. schreberiana var. *robusta* - **Aroostook**: 16388.

D. varia - **Aroostook**: 16388A.

Dicranodontium denudatum - **Washington**: Holmes 138.

Dicranum flagellare - **Aroostook**: 16306; **Kennebec**: 15743.

D. fulvum - **Knox**: 14631; **Penobscot**: 16531; **Sagadahoc**: 16629; **Washington**: Holmes 104.

D. majus - **Oxford**: Holmes 253.

D. montanum - **Androscoggin**: 14654; **Penobscot**: 16545.

D. ontariense - **Washington**: Holmes 297.

D. polysetum - **Androscoggin**: 14675; **Kennebec**: 14782; **Sagadahoc**: 14606.

D. scoparium - **Knox**: 14640.

D. spurium - **Sagadahoc**: 14600; **Washington**: Holmes 314.

D. viride - **Androscoggin**: 14693; **Aroostook**: 16316; **Cumberland**: 15919; **Hancock**: 16293; **Kennebec**: 14787; **Lincoln**: Solomon 20125; **Piscataquis**: 16554A.

Paraleucobryum longifolium - **Aroostook**: 16411; **Kennebec**: 14792; **Penobscot**: 16510; **Washington**: Holmes 323.

Rhabdoweisia crispata - **Franklin**: 15858.

Trematodon ambiguus - **Washington**: 16269.

DITRICHACEAE

Ditrichum lineare - **Aroostook**: 16405.

ENCALYPTACEAE

Encalypta procera - **Lincoln**: 16642.

EPHEMERACEAE

Ephemerum spinulosum - **Penobscot**: Crane (MAINE).

FABRONIACEAE

Anacamptodon splachnoides - **Cumberland**: 15924; **Washington**: Pedano 583.

FISSIDENTACEAE

Fissidens adianthoides - **Penobscot**: Pursell 11431.

F. bryoides - **Aroostook**: Pursell 11378. This collection keys out to F. obtusifolius var. apiculatus in Crum and Anderson (1982), but according to Ronald Pursell (pers. comm.) it actually is an expression of F. bryoides in which the limbidia are restricted to the vaginant laminae.

F. bushii - **Franklin**: Pursell 11149; **Kennebec**: 14791; **Penobscot**: 16534; **Piscataquis**: Pursell 11468.

F. dubius - **Aroostook**: Pursell 11422.

F. fontanus - **Kennebec**: 15739.

FONTINALACEAE

Dichelyma capillaceum - **Kennebec**: 14757; **Knox**: 14645; **Washington**: 16280.

Fontinalis antipyretica - **Kennebec**: 15722; **Waldo**: Solomon 20181.

F. dalecarlica - **Franklin**: 15872; **Lincoln**: 16589; **Washington**: 16879.

F. duriaei - **Aroostook**: 16382.

F. flaccida - **Sagadahoc**: 15766.

F. gigantea - **Lincoln**: 16588; **Penobscot**: 16490.

F. hypnoides - **Aroostook**: 16374.

F. novae-angliae - **Franklin**: 15873; **Knox**: 14646; **Penobscot**: 16497; **Washington**: 16275.

FUNARIACEAE

Funaria hygrometrica - **Androscoggin**: 14716B; **Cumberland**: Blake (MAINE); **Hancock**: Norton (MAINE); **Knox**: Norton (MAINE); **Oxford**: Holmes 250; **Piscataquis**: 16576; **Sagadahoc**: 14601.

Physcomitrium pyriforme - **Aroostook**: 16427; **Cumberland**: Blake (MAINE); **Oxford**: Williams (MAINE).

GRIMMIACEAE

Grimmia hermannii - **Cumberland**: 15903; **Franklin**: 15891; **Kennebec**: 14762; **Penobscot**: 16498.

G. olneyi - **Oxford**: Holmes 370.

Racomitrium aciculare - **Androscoggin**: 14715.

R. heterostichum var. *sudeticum* - **Cumberland**: 15928.

Schistidium apocarpum - **Kennebec**: 15703; **Knox**: 14625.

S. maritimum - **Washington**: 16282.

S. rivulare - **Androscoggin**: 14689.

HEDWIGIACEAE

Hedwigia ciliata - **Androscoggin**: 14681; **Aroostook**: 16449; **Franklin**: Pursell 11151; **Knox**: 14613; **Piscataquis**: 16552.

HYLOCOMIACEAE

Hylocomium splendens - **Oxford**: Holmes 251; **Sagadahoc**: 16602; **Washington**: Holmes 142.

H. umbratum - **Aroostook**: 16473.
Pleurozium schreberi - **Androscoggin**: 14670; **Aroostook**: 16340.
Rhytidiadelphus squarrosus - **Piscataquis**: 16584.
R. triquetrus - **Lincoln**: Solomon 20097; **Hancock**: 16290; **Piscataquis**: 16580; **Sagadahoc**: Holmes 249; **Washington**: 16277.
HYPNACEAE
Callicladium haldanianum - **Androscoggin**: 14651; **Aroostook**: 16341; **Knox**: 15796.
Herzogiella striatella - **Androscoggin**: 14650; **Aroostook**: 16451; **Franklin**: 15855; **Hancock**: Davis 286; **Oxford**: 16647; **Sagadahoc**: 14597.
H. turfacea - **Aroostook**: 16413; **Hancock**: Magill 11797; **Sagadahoc**: 14605.
Hypnum curvifolium - **Knox**: 14620.
H. fertile - **Franklin**: Pursell 11135; **Sagadahoc**: 16610.
H. imponens - **Androscoggin**: 14703; **Cumberland**: Holmes 165.
H. lindbergii - **Androscoggin**: 14658; **Aroostook**: 16356; **Penobscot**: 16499.
H. mammillatum - **Cumberland**: Jewett [Grout, N. Amer. Musci Pleuro. 385].
H. pallescens - **Aroostook**: 16419.
Isopterygiopsis muelleriana - **Androscoggin**: 14722.
Platydictya subtile - **Aroostook**: 16450.
Platygyrium repens - **Aroostook**: 16298; **Cumberland**: 15906; **Penobscot**: 16549; **Piscataquis**: 16570; **Sagadahoc**: 16630.
Pseudotaxiphyllum elegans - **Androscoggin**: 14657; **Aroostook**: 16471; **Washington**: 16285.
P. distichaceum - **Sagadahoc**: 16591.
Ptilium crista-castrensis - **Sagadahoc**: 16607.
Pylaisiella intricata - **Aroostook**: 16377; **Lincoln**: 14747.
P. polyantha - **Aroostook**: 16429.
P. selwynii - **Aroostook**: 16344; **Piscataquis**: 16564.
Taxiphyllum deplanatum - **Sagadahoc**: 15773.
LESKEACEAE
Haplocladium microphyllum - **Piscataquis**: 16574.
Leskea gracilescens - **Penobscot**: 16495A.
L. polycarpa - **Cumberland**: 15912.
Leskeella nervosa - **Aroostook**: 16463; **Cumberland**: 15933.
LEUCOBRYACEAE
Leucobryum albidum - **York**: Bold 208 (TENN); **Washington**: Holmes 111.
L. glaucum - **Androscoggin**: 14664; **Aroostook**: 16455; **Knox**: 15802.
LEUCODONTACEAE
Leucodon brachypus var. *andrewsianus* - **Aroostook**: 16343; **Kennebec**: 14777; **Piscataquis**: 16572; **Sagadahoc**: 16623.

MNIACEAE

Mnium hornum - **Androscoggin**: 14697; **Cumberland**: 15905; **Knox**: 14614; **Waldo**: Solomon 20173.

M. stellare - **Aroostook**: 16305.

M. spinulosum - **Hancock**: Magill 11798.

Plagiomnium ciliare - **Aroostook**: Lowe (MAINE); **Cumberland**: Lowe (MAINE); **Kennebec**: Redfearn 37812; **Oxford**: Lowe (MAINE); **Penobscot**: 16535; **Piscataquis**: Richards & Cooper 157 (MAINE); **Somerset**: Lowe (MAINE).

P. cuspidatum - **Androscoggin**: 14711; **Aroostook**: Norton (MAINE); **Cumberland**: Chamberlain 2859 (MAINE); **Franklin**: 15845; **Sagadahoc**: 14596B.

P. drummondii - **Aroostook**: Lowe (MAINE); **Kennebec**: Lowe (MAINE); **Penobscot**: Harvey (MAINE); **Piscataquis**: Merrill 159 (MAINE).

P. ellipticum - **Franklin**: Richards 5392 (MAINE).

P. medium - **Piscataquis**: Norton (MAINE); **York**: Lowe (MAINE).

Pseudobryum cinclidioides - **Aroostook**: 16312; **Cumberland**: Lowe (MAINE); **Franklin**: Lowe (MAINE); **Penobscot**: 16532.

Rhizomnium punctatum - **Knox**: 15791; **Oxford**: 16759.

NECKERACEAE

Homalia trichomanoides - **Androscoggin**: 14734B.

Neckera pennata - **Washington**: Holmes 341.

ORTHOTRICHACEAE

Drummondia prorepens - **York**: Blake 332.

Orthotrichum anomalum - **Kennebec**: 15730.

O. obtusifolium - **Aroostook**: 16342; **Piscataquis**: 16564A.

O. ohioense - **Kennebec**: 15710B; **Penobscot**: 16543.

O. pusillum - **Sagadahoc**: 16605.

O. sordidum - **Aroostook**: 16418.

O. speciosum var. *elegans* - **Aroostook**: 16362.

O. stellatum - **Kennebec**: 15715; **Penobscot**: 16543A; **Piscataquis**: 16558A.

Ulota coarctata - **Aroostook**: 16337; **Penobscot**: 16520A.

U. crispa - **Aroostook**: 16334; **Cumberland**: 15930; **Piscataquis**: 16557A.

U. hutchinsiae - **Franklin**: 15881; **Hancock**: Magill 11790; **Kennebec**: 15742; **Oxford**: Holmes 376.

PLAGIOTHECIACEAE

Plagiothecium cavifolium - **Franklin**: 15870; **Kennebec**: 14752; **Oxford**: 16691; **Penobscot**: 16502.

P. denticulatum - **Hancock**: Magill 11785; **Kennebec**: 14756; **Penobscot**: 16546.

P. laetum - **Aroostook**: 16399.

POLYTRICHACEAE

Atrichum altecristatum - **Aroostook**: 16406; **Lincoln**: 16252; **Oxford**: Holmes 53.

A. angustatum - **Hancock**: 16289; **Sagadahoc**: 14582; **Waldo**: Solomon 20170.
A. crispum - **Cumberland**: Norton (MAINE).
A. oerstedianum - **Androscoggin**: Norton (MAINE); **Aroostook**: 16441; **Knox**: 14630; **Penobscot**: 16511; **Washington**: Holmes 291.
A. undulatum - **Piscataquis**: 16575; **Sagadahoc**: Holmes 47.
Pogonatum dentatum - **Washington**: 16270.
P. pensilvanicum - **Knox**: 15787; **Oxford**: 16721; **Washington**: Holmes 364.
P. urnigerum - **Oxford**: 16682; **Washington**: Holmes 278.
Polytrichastrum alpinum - **Androscoggin**: 14666; **Aroostook**: 16456; **Lincoln**: 16590; **Oxford**: 16681.
Polytrichum commune - **Androscoggin**: 14660; **Cumberland**: 15923; **Franklin**: 15835; **Penobscot**: 16550.
P. juniperinum - **Androscoggin**: 14705; **Kennebec**: 14758; **Sagadahoc**: 16778.
P. pallidisetum - **Androscoggin**: 14671; **Aroostook**: 16398.
P. piliferum - **Androscoggin**: 14673; **Cumberland**: 15932; **Kennebec**: 14781; **Penobscot**: 16512; **Washington**: Holmes 284.
P. strictum Brid. - **Franklin**: 15820; **Hancock**: 16281; **Lincoln**: 14749; **Sagadahoc**: 14583; **Washington**: 16271.
POTTIACEAE
Barbula unguiculata - **Androscoggin**: 14676; **Aroostook**: 16370; **Lincoln**: 16646.
Bryoerythrophyllum recurvirostre - **Androscoggin**: 14688; **Aroostook**: 16371.
Tortella tortuosa - **Androscoggin**: 14713.
Tortula papillosa - **Lincoln**: 15750.
PTERIGYNANDRACEAE
Myurella sibirica - **Androscoggin**: 14728.
Pterigynandrum filiforme - **Aroostook**: 16420; **Cumberland**: 15927; **Oxford**: 16696; **Penobscot**: 16514; **Piscataquis**: 16553A.
SCHISTOSTEGACEAE
Schistostega pennata - **Androscoggin**: 14745; **Cumberland**: Brooks (MAINE); **Kennebec**: Lowe (MAINE); **Oxford**: Rooney (MAINE).
SELIGERIACEAE
Blindia acuta - **Somerset**: 9312D.
SEMATOPHYLLACEAE
Brotherella recurvans - **Aroostook**: 16438; **Cumberland**: 15916; **Piscataquis**: 16556; **Sagadahoc**: 16600; **Washington**: Holmes 100.
SPHAGNACEAE
Sphagnum affine - **Cumberland**: 15911.
S. angermanicum - **Washington**: Holmes 362.
S. angustifolium - **Franklin**: 15832.
S. capillifolium - **Aroostook**: 16329; **Sagadahoc**: 14586.
S. centrale - **Kennebec**: 14772.

S. cuspidatum - **Cumberland**: 15899; **Hancock**: Holmes 88; **Sagadahoc**: 15751.
S. fallax - **Sagadahoc**: 14603.
S. fimbriatum - **Androscoggin**: 14663; **Sagadahoc**: 15778.
S. flavicomans - **Hancock**: Holmes 349; **Washington**: Holmes 152.
S. fuscum - **Hancock**: Holmes 348; **Washington**: Holmes 308.
S. girgensohnii - **Cumberland**: 15921; **Franklin**: Pursell 11153.
S. lescurii - **Kennebec**: 14766; **Knox**: 14626.
S. magellanicum - **Cumberland**: 15936; **Sagadahoc**: 15753.
S. majus - **Washington**: Holmes 311.
S. palustre - **Androscoggin**: 14704; **Cumberland**: 15902; **Sagadahoc**: 15754; **Washington**: Holmes 310.
S. papillosum - **Hancock**: Holmes 93; **Washington**: Holmes 305.
S. pulchrum - **Hancock**: Holmes 94; **Washington**: Holmes 302.
S. pylaesii - **Washington**: Holmes 328.
S. quinquefarium - **Franklin**: 15813; **Hancock**: Magill 11805.
S. russowii - **Androscoggin**: 14717; **Aroostook**: 16466; **Cumberland**: 15937; **Franklin**: Pursell 11148; **Washington**: Holmes 352.
S. squarrosum - **Aroostook**: 16300; **Franklin**: 15811; **Washington**: Holmes 156.
S. strictum - **Washington**: Holmes 353.
S. subsecundum - **Cumberland**: 15910.
S. subtile - **Lincoln**: 16635.
S. tenellum - **Hancock**: Holmes 345.
S. torreyanum - **Hancock**: Holmes 343; **Washington**: Holmes 363.
S. warnstorfii - **Washington**: Holmes 351.

SPLACHNACEAE

Splachnum ampullaceum - **Cumberland**: Norton (MAINE); **Kennebec**: Brower (MAINE); **Penobscot**: Sorenson 132 (MAINE).
S. rubrum - **Aroostook**: Roony & Cawler (MAINE).
Tetraplodon angustatus - **Oxford**: Lowe [with T. mnioides] (MAINE); **Piscataquis**: Lowe (MAINE); **Washington**: Holmes 356.
T. mnioides - **Oxford**: Lowe (MAINE); **Piscataquis**: Lowe (MAINE).

TETRAPHIDACEAE

Tetraphis geniculata - **Washington**: 16283.
T. pellucida - **Androscoggin**: 14684.
Tetrodontium ovatum - **Piscataquis**: Collins (in FH & MICH). Reported from Maine (Kennedy & Collins 1901, Collins 1901) as Tetrodontium brownianum rigidum (Funck) Jur. Barbara Murray (ALA) and Jerry Snider (CINC) examined the plants on which these reports were based and determined them to be T. ovatum (Funck) Schwaegr.

THAMNOBRYACEAE

Thamnobryum alleghaniense - **Androscoggin**: 14700.

THUIDIACEAE

Rauiella scita - **Aroostook**: 16461; **Piscataquis**: 16560.

Thuidium delicatulum - **Franklin**: 15808; **Kennebec**: 15706; **Knox**: 14639; **Penobscot**: 16506.

T. recognitum - **Aroostook**: 16324.

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New or Rare Lichens/Lichenicolous Fungi for North America

Richard C. Harris[1]

Abstract. Heterodermia comosa *(Eschw.) Follm. & Redón,* Lecidea ahlesii *(Körber) Nyl. and* Sarcopyrenia cylindrospora *(Crouan & Crouan) Aguirre are reported as new for North America. New records for the rare taxa* Cladonia psoromica *Dey and* Pyrenula lucifera *R. C. Harris are cited.*

Cladonia psoromica Dey

Until now *C. psoromica* has been known only from Ashe County, North Carolina (Dey, 1973). I have had a *Cladonia* collection from New York with psoromic acid dumped under *boryi* Tuck. After a recent glance at it I realized that it has the morphology of *C. dimorphoclada* Robbins, i.e., narrow, ± recumbent podetia with acute, downturned tips. Examination of the type material of *C. psoromica* at DUKE showed that although the lobes are broader and ± more inflated (some slightly shiny), it too seems to fall within the variation of *C. dimorphoclada. Cladonia dimorphoclada* usually contains only usnic acid and terpenoids but I have a collection from northern Alabama containing squamatic acid. The *Cladonia caroliniana-dimorphoclada*-complex is in dire need of revision. Although I make no formal synonymy here, I suggest that the concept of *C. dimorphoclada* might be broadened to include psoromic acid and squamatic acid strains.

New York. Rockland County, Pine Meadow Mountain, 1070 ft, 17 Jul 1963, *Fleming, Fleming & Nearing* (NY).

Heterodermia comosa (Eschw.) Follm. & Redón

I have seen scraps of this species from the United States several times over the years but it wasn't until this summer when I went to look up the author citation that I realized it had not been reported for North America. I guess I had assumed previously that since it was common in Mexico and the Caribbean that it was known from the Southwest. *Heterodermia comosa* is one of the small fruticose species and is characterized by having laminal cilia on both lobes and apothecia. Apothecia are often present but when lacking the expanded lobe tips are usually sorediate beneath. *Heterodermia comosa s. str.* contains atranorin and terpenoids. Thalli containing norstictic acid agg. have been recognized as *H. cubensis* (Kurok.) Trass, but I consider them to be only a minor chemical variant. *Heterodermia comosa* is rarely found in any concentration but occurs as scattered thalli on small branches in dry, open scrub forests.

Texas. Gonzales County: Palmetto State Park, 7 mi S of Luling, arid farmland, 10 Jun 1956, *Kramer 1694* (NY).

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Lecidea ahlesii (Körber) Nyl.

This species is a member of the *L. berengeriana-hypnorum-sanguineoatra* group which is placed in *Mycobilimbia* Rehm by Hafellner (1989). However, Coppins (in Purvis et al., 1992) treats *Mycobilimbia* as a synonym of *Biatora* Fr. and places the above species in *Lecidea* s. lat. I am unaware of any formal resolution of this difference of opinion which is presumably based on interpretation of the type material of *M. obscurata* (Sommerf.) Rehm. The asci of this group are of the *Porpidia*-type and if *Mycobilimbia* is indeed not available, I would think a new genus is needed. *Lecidea ahlesii* is the saxicolous member of the group. It has bluish-black granules (KOH+ blue-green) in the hymenium and exciple, rather broad ascospores for the group (12-17 × (5-)6-7(-9) μm fide Purvis et al., 1992), brown, biatorine apothecia with the margin soon excluded and a thin, continuous, gray-green thallus. The United States collection was made on shaded, acidic sandstone in a temporary stream surely inundated in wet seasons.This agrees with the ecology given by Purvis et al. (1992).

Illinois. Jackson County, Shawnee National Forest, Pomona Natural Bridge, ca. 8 mi S of Murphysboro, ca. 37°38'N, 89°20'W, beech-maple woods, 15 Oct 1993, *Harris 31294* (NY).

Pyrenula lucifera R. C. Harris

In Harris (1989) it was suggested that three newly described taxa might actually be extinct. One of these has now been found alive and well and the range is expanded westward. *Pyrenula lucifera* is one of the few North American taxa containing lichexanthone and is distinguished from the other such by ascospores (Harris, 1989, fig. 41). All collections of *P. lucifera* are from yellow or black birch from Massachusetts, New York, North Carolina, Tennessee and now Ohio. The latest collection previously known was from 1897. The absence of collections in the intervening years is perhaps related to collecting activity.

Ohio. Hocking County, along trail from Old Mans Cave State Park to Cedar Falls State Park, E of Bloomingville, on black birch, 1 Sep 1968, *Erbisch 2888* (MIN, NY). Tennessee. Scott County, Big South Fork National River and Recreation Area, Honey Creek Quad., along small tributary to North White Oak Creek, 36°27'05"N, 84°40'30"W, 275-300 m, humid hemlock-hardwood-rhododendron forest, 7 Aug 1994, *Buck 25189* (NY).

Sarcopyrenia cylindrospora (Crouan & Crouan) Aguirre

This is the first report of the genus *Sarcopyrenia* Nyl. for North America. The taxonomic position of the genus is not clear nor perhaps its biological status, although it seems to be unitunicate and lichenicolous. *Sarcopyrenia* is recognized by the small perithecia on rock (resembling *Verrucaria*), absence of paraphyses, asci with thin, uniform walls and bacillar to filiform ascospores.The Tennessee collection agrees with *S. cylindrospora* in ascomatal anatomy, size and septation of the ascospores as given by Navarro-Rosinés & Hladun (1990) and Aguirre-Hudson (1991) but the ascospores are somewhat swollen at the ends and might actually represent an undescribed species. I have not studied authentic *S. cylindrospora*. The Tennessee collection is associated with a thin, continuous, sterile thallus lacking lichen substances (TLC). No "host" is given for the type (France), the Spanish collection is on *Aspicilia*, and British collections are "among crustose lichens" and on *Candelariella vitellina* (Hoffm.) Müll. Arg. When some brave soul finally sorts through accumlated specimens of "*Verrucaria*", *Sarcopyrenia* may prove more common.

Tennessee. Greene County, Cherokee National Forest, Greene Mountain, 2.3 mi N of Co. Rd. 42 on Greene Mountain Road, ca. 36°01'30"N, 82°46'W, 730 m, mesic mixed hardwoods on rocky slope, 17 Sep 1991, *Buck 20855 (NY).*

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Campylostelium saxicola New to Indiana, *Cryphaea ravenelii* New to Virginia, Comments on *Cryphaea filiformis* and *Schoenobryum concavifolium* in Florida, a Note on A. J. Grout's *North American Musci Perfecti* Number 218, and an Observation on O. E. Jennings' Illustration for *Ptychomitrium incurvum*

William Dean Reese[1]

Review of herbarium specimens of mosses for work toward the bryophyte volume of the Flora of North America project has revealed some new state records and other items worthy of comment, as reflected in the title of this article.

1. *Campylostelium saxicola* (Weber & Mohr) Bruch & Schimper

This tiny moss (Ptychomitriaceae) is reported new for Indiana on two specimens from Morgan County. The two specimens apparently represent a divided single original collection: 6 mi NE of Martinsville, *W. H. Welch 10186*, 20 Sept. 1941 (NY); 6 mi. from Martinsville, on sand stone side of ravine, *W. H. Welch s.n.*, 9-20-1941 (WTU). Both specimens were previously determined as *Ptychomitrium incurvum* (Schwägrichen) Spruce.

Morgan County is just south of the center of the state of Indiana. The material cited above is surely the basis for Welch's inclusion of *Ptychomitrium incurvum* for Indiana (Welch 1957, p. 180). Welch cited only Morgan County for *P. incurvum*, and stated the habitat as exposed rock. In my review of herbarium specimens of *Ptychomitrium* for the Flora of North America project I have not yet seen any authentic specimens of *P. incurvum* from Indiana, although the species is known from all states contiguous with Indiana.

2. *Cryphaea ravenelii* Austin

This rare moss (Cryphaeaceae) is reported new to Virginia on a specimen from Dinwiddie County: *R. P. Carroll 78*, 15 April 1932 (NY).

Dinwiddie County is in southern Virginia, just southwest of Petersburg, and is the northernmost locality for *C. ravenelii*. The specimen was previously determined as *C. glomerata*. In addition to that from Virginia, I have seen authentic specimens of *C. ravenelii* from Arkansas, Georgia, Mississippi, North Carolina, Oklahoma, South Carolina, and Tennessee, as reported by Manuel (1973).

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3. *Cryphaea filiformis* (Hedwig) Bridel

In Sharp et al. (1994, p. 691) the range of *C. filiformis* (Cryphaeaceae) is stated to include "Georgia and Florida," but the reference to Georgia is clearly an error based on misinterpretation of the label of Grout's original issue of his *North American Musci Perfecti* Number 218, which included *C. filiformis* and *C. glomerata*, (and in some examples, other mosses): "On trees and shrubs in woods. Slender light-green form from Deep Lake, Florida. March 31, 1931. Darker form from near Americus, Georgia. April, 1931." The light-green form is *C. filiformis* and the darker form is *C. glomerata* Sullivant. Part of this material was cited by Grout (1934) as the type for his *Cryphaea glomerata* var. *scabra* Grout var. nov. (≡ *C. filiformis*; see Manuel 1973 and discussion under *Schoenobryum concavifolium*, below; see also Note 5, below). The holotype of Grout's *C. glomerata* var. *scabra* (NY) is uniformly *C. filiformis*.

Cryphaea filiformis is known in the United States only from southern Florida, from at least seven collections taken in Collier County; it is also of wide occurrence in the American tropics.

4. *Schoenobryum concavifolium* (Griffith) Gangulee

This species (Cryphaeaceae) was recently reported new to the United States by Buck (1994) on three specimens he collected in Collier County, Florida. Formerly known in the Americas as, i.a., *Acrocryphaea coffeae* (C. Müller) Paris, this moss is widespread in the American tropics and is also in Asia. Interestingly, the species had been collected at least twice previously in Collier County, Florida, by A. J. Grout in 1931 and by A. J. Sharp in 1948, but was not recognized.

The reason the *S. concavifolium* was not recognized is that it was growing in mixture with other mosses, including, i.a., the very similar *Cryphaea filiformis* and *C. glomerata*, as well as other mosses. This is demonstrated in particular by one example of Grout's exsiccata, *North American Musci Perfecti* Number 218, ex herb. Winona H. Welch (NY). This specimen includes *Schoenobryum concavifolium*, *Cryphaea filiformis*, *C. glomerata*, *Leucodon julaceus* (Hedwig) Sullivant, and *Papillaria nigrescens* (Hedwig) Jaeger. To date I have seen four other examples of Grout's original issue (see Note 5, below) of Number 218 (CANM, DUKE, MO, TENN). Those at CANM, DUKE and MO include *C. filiformis* and *C. glomerata* but not *S. concavifolium*, while the example at TENN includes *C. filiformis*, *C. glomerata*, and *S. concavifolium*.

Schoenobryum concavifolium, *C. filiformis*, and *C. glomerata* are almost identical to one another in most regards. Macroscopically they differ most apparently only in the position of the perichaetia and sporophytes--lateral on the branches in *Cryphaea* but terminal at branch tips in *Schoenobryum*. When Grout studied his mixed collection he was confused by the intermingled plants of the three Cryphaeaceous species, as reflected by his comment when he used this mixed material to describe the *C. filiformis* component (1934; as *C. glomerata* var. *scabra* Grout var. nov.): "Capsules often at the end of stem or branch and relatively inconspicuous." Terminal capsules are characteristic of *Schoenobryum* but not of *Cryphaea*. (See Note 5, below.) The Sharp collection of *S. concavifolium* from Florida (CANM, TENN) includes a liberal admixture of *C. filiformis*.

5. A. J. Grout's *North American Musci Perfecti* Number 218

The original issue of Grout's *North American Musci Perfecti* Number 218, under the name *Cryphaea glomerata*, was distributed in 1931 (Sayre 1971). This is the issue referred to above in the present article. The packets of this issue contain a mixture of plants from Florida and Georgia, as noted on the label and as described in notes 3 and 4 above.

At a later time Grout reissued his Number 218, using the original labels but with the letter "a" written after "218" and with the original locality information and dates of collection lined through with ink. The new locality is handwritten: Ocala National Forest, Florida, and the new date of collection is 19 February 1931. The name "F. W. Gray, " or simply "Gray," is written in as the collector. The two examples of the reissue I have seen (DUKE, MO) have different handwriting on the modified labels and contain only *C. glomerata*.

Sayre (1971; p. 206) notes that Grout sometimes issued supplementary specimens of his exsiccatae with later fascicles, with the original numbers followed by "A," although in the examples cited above a lowercase "a" was used.

6. O. E. Jennings' Illustration for *Ptychomitrium incurvum* (Schwägrichen) Spruce

Jennings (1951, pl. LXIII) illustrated *Ptychomitrium incurvum* for Western Pennsylvania from the following specimen (fid. Jennings 1951, p. 95): "Westmoreland Co.: On limestone rock, 1 1/2 miles east of Hillside, Chestnut Ridge, C.M.B. May 30, 1936." The specimen is at MO and is comprised entirely of *Schistidium apocarpum* Bruch & Schimper. "C.M.B." is Charles M. Boardman.

The Boardman specimen is the only one cited by Jennings for western Pennsylvania. Most of the leaves in the specimen are muticous but some have hyaline points. Jennings' moss herbarium was formerly at CM but--along with the other mosses at CM--was transferred to MO in 1981.

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The Missouri Botanical Garden (MO) announces the acquisition by gift of the Bryological Herbarium of **The Pennsylvania State University (PAC)**. This collection consists of about 25,000 specimens, mostly from North America. The collection includes an excellent representation of world-wide *Fissidens* and has strong holdings of Western Hemispheric Erpodiaceae. These two groups constitute the special research interests of R. A. Pursell.

The MO herbarium is rich in Pennsylvania mosses, having previously acquired the CM bryophyte herbarium, the basis for Otto Jenning's formative *The Mosses of Western Pennsylvania*. The PAC herbarium, with its numerous collections from Central Pennsylvania, complements this previous acqusition. The personal herbaria of Monte Manuel, Bruce Allen, and Lloyd Stark, also strong in Pennsylvania mosses, have been deposited in MO. Furthermore, these three collections are strong in mosses from Mexico and Malaysia (Manuel), Maine and Delaware (Allen), and California and New Mexico (Stark).

Educational Opportunities

GRADUATE ASSISTANTSHIPS IN BRYOLOGY

Under the sponsorship of the National Science Foundation PEET program, graduate assistantships (Ph.D. or M.S.) are available at Southern Illinois University-Carbondale, for students interested in the biology and systematics of liverworts. Each graduate assistant will be mentored by Dr. Raymond Stotler and Dr. Barbara Crandall-Stotler as a participant in a world-wide monographic study of the phylogenetically pivotal, cosmopolitan simple thalloid liverwort suborder Fossombroniineae. Each participant in the project will gain field experience and learn standard taxonomic methods as well as statistical methods for analyzing variation patterns, culture techniques, SEM, computerized image capturing and analysis, starch gel electrophoresis, DNA sequencing protocols, and data networking via World Wide Web. The Plant Biology Department offers a selection of more than 40 graduate courses, including three in bryology, taught by 18 full time faculty. In addition, doctoral student participants in the project will have the opportunity to spend one semester of their studies at the University of California at Berkeley, where they will participate in a course in phylogenetics, under the supervision of Dr. Brent Mishler. Each assistantship provides a monthly stipend, complete tuition and partial payment of fees for the duration of graduate study. For application information and materials, contact: Dr. Raymond Stotler, Department of Plant Biology, Mail Code 6509 Southern Illinois University, Carbondale, IL 62901-6509. PH (618)-536-2331; FAX (618)-453-3441; e-mail stotler@qm.c-plant.siu.edu. Assistantships commence August 1996.

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